Restoring the Dominant Plant Species on Disturbed in Arid Lands

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Creosotebush and White Bursage

Larrea tridentata (LATR) and *Ambrosia dumosa* (AMDU)

Objective:

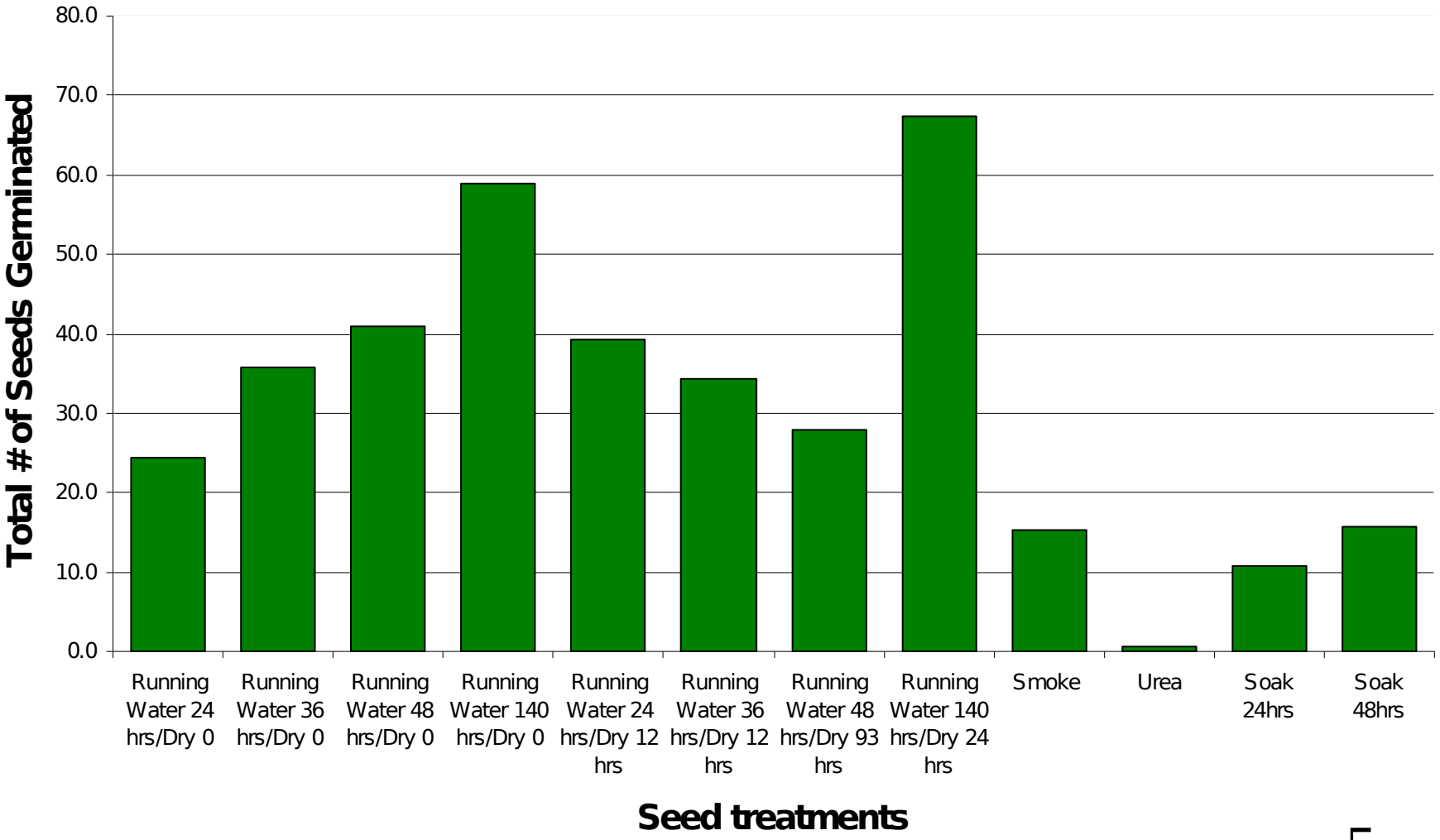
Improve germination and establishment of Creosote and White Bursage

Methods
Series of Experiments

- **Breaking Seed Dormancy**
- **Enhancing Germination**
  - **Light**
  - **Temperature**
  - **Moisture**
  - **Source**
- **Performance in Field**

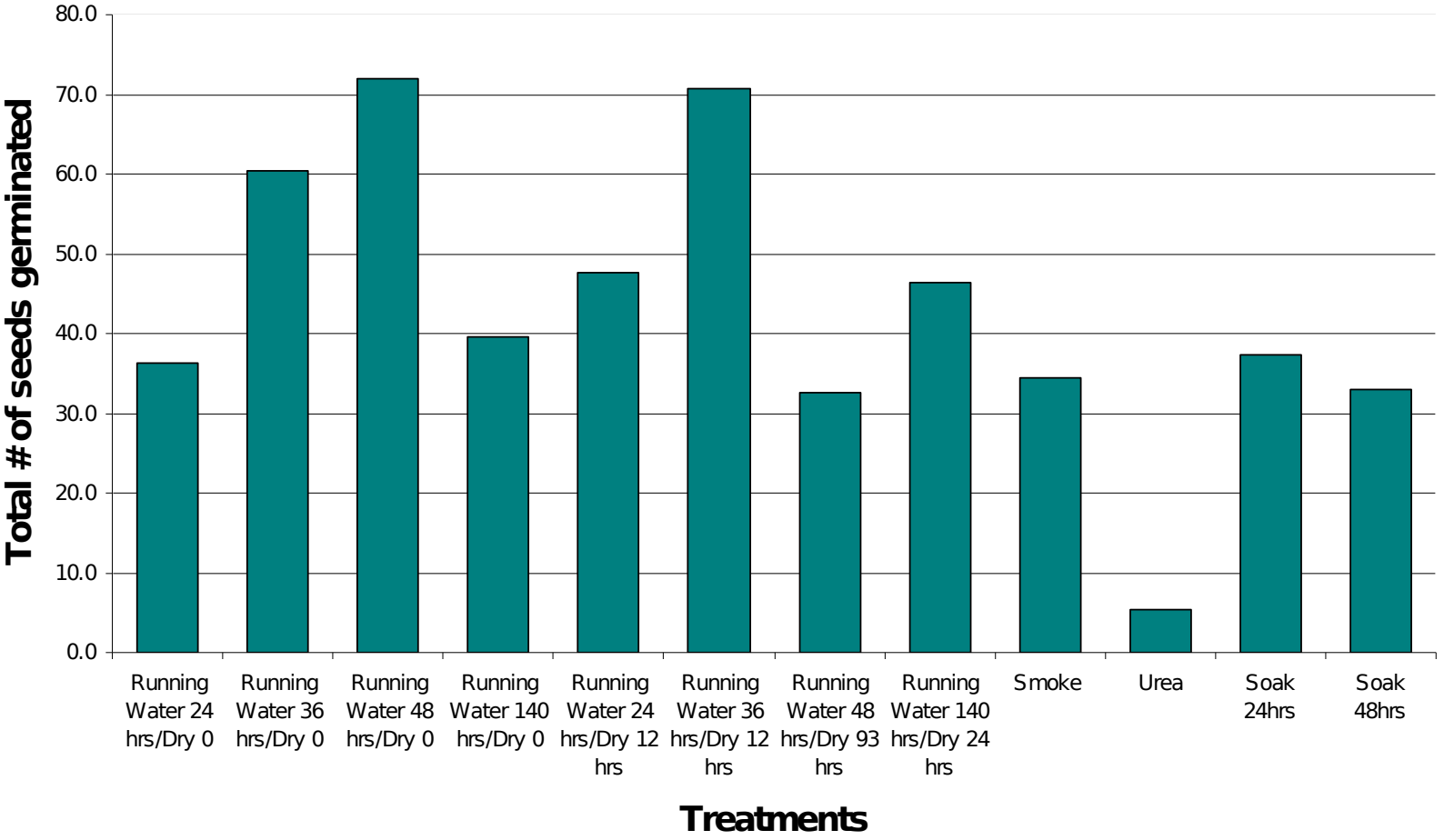
Results - Experiment 1

Dormancy Treatments for *Larrea tridentata*



Results - Experiment 1

Seed Treatments for *Ambrosia dumosa*

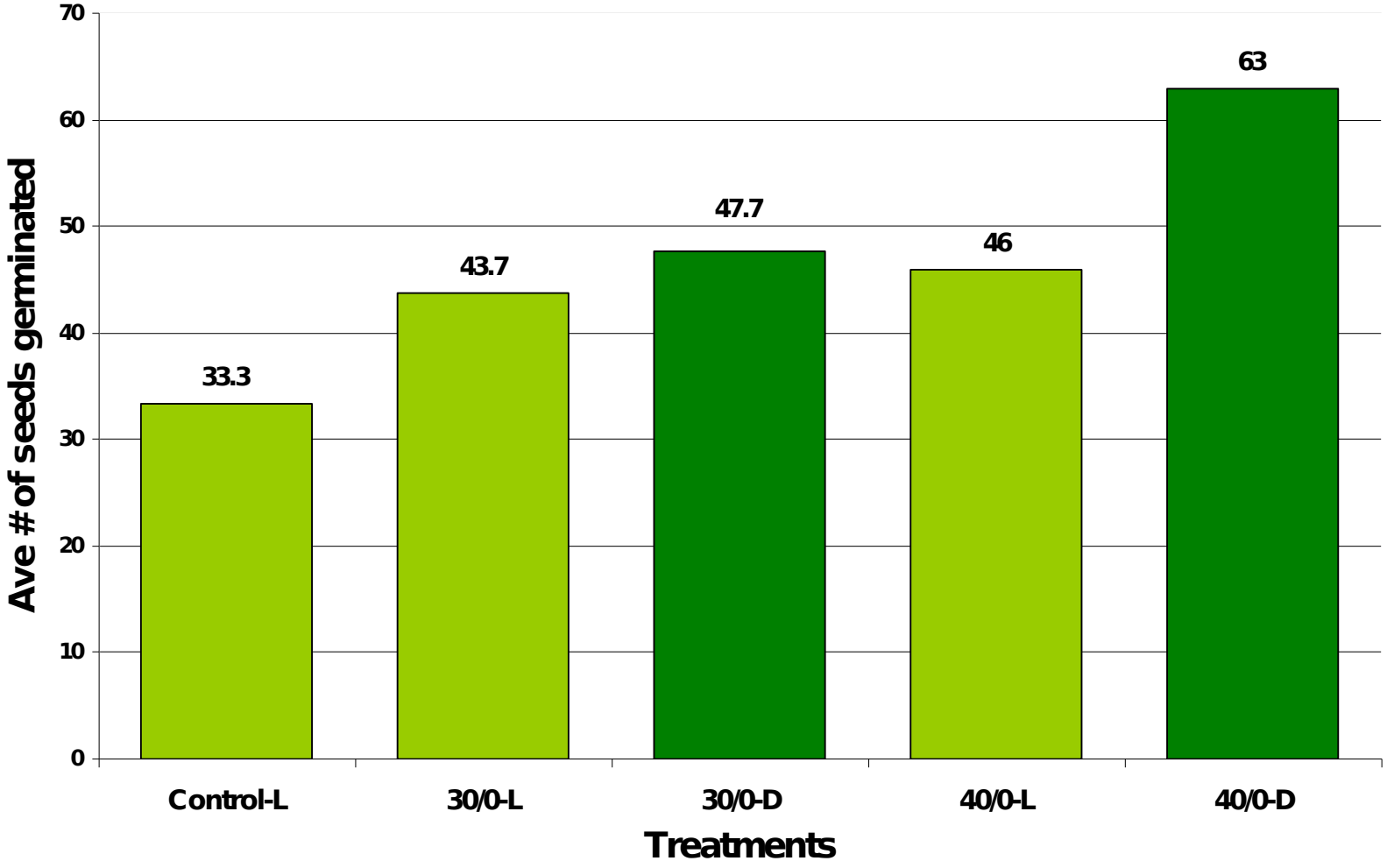


Experiment 2
Treatments - Petri dishes

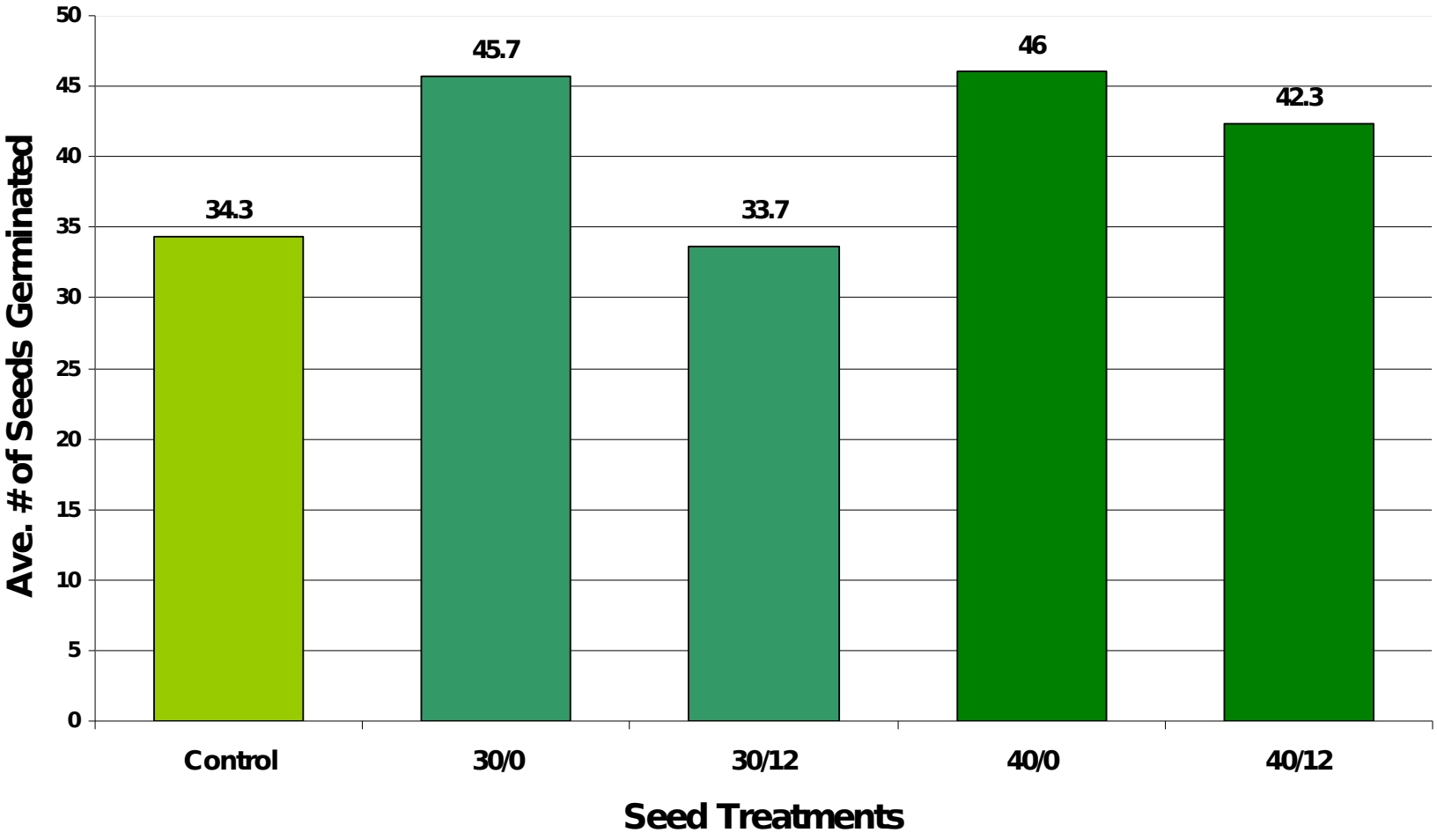
- **Light/Dark**
- **Drying**
- **Refrigeration**
- **Seed Source**

Results - Experiment 2

Light impact on Germination of *Larrea tridentata*

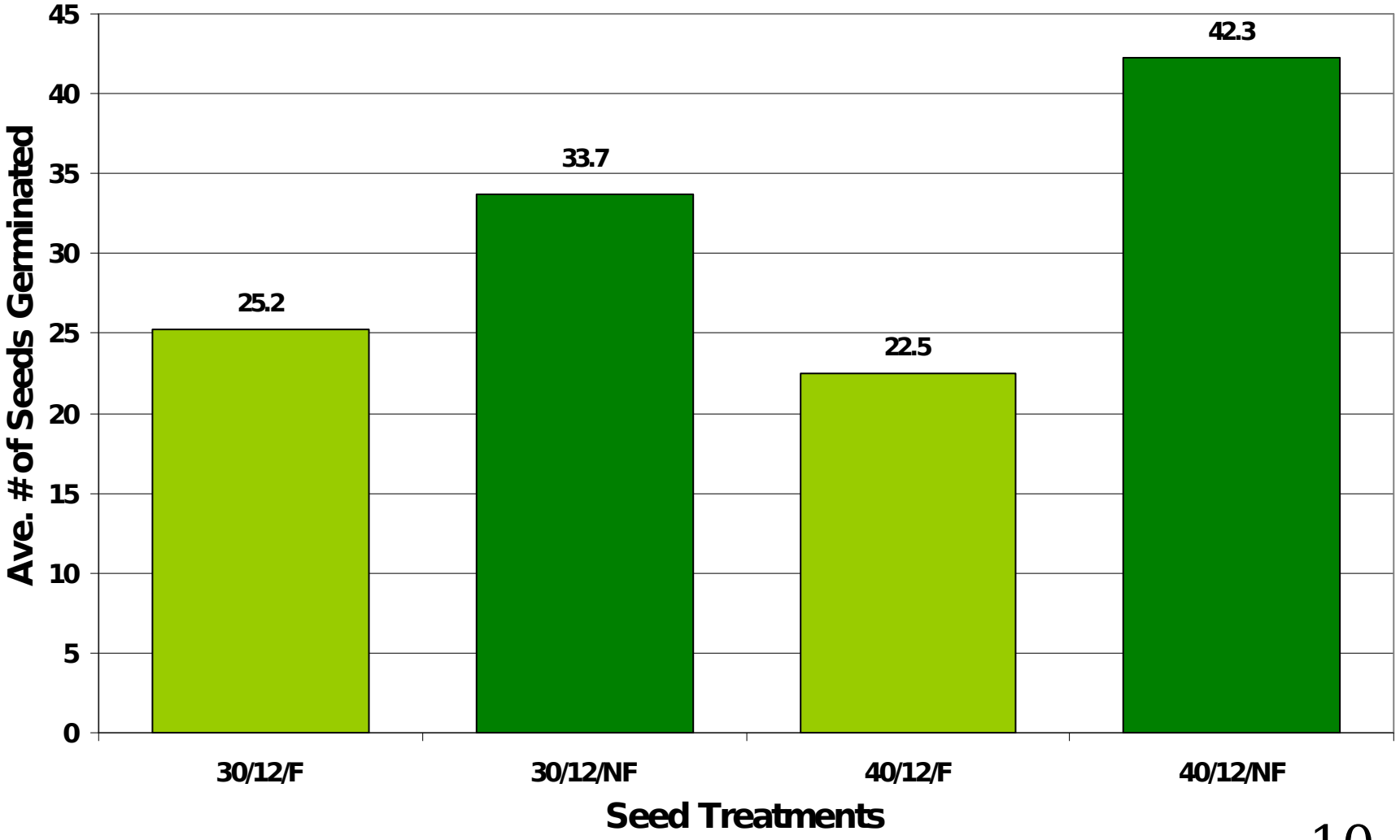


Results - Experiment 2



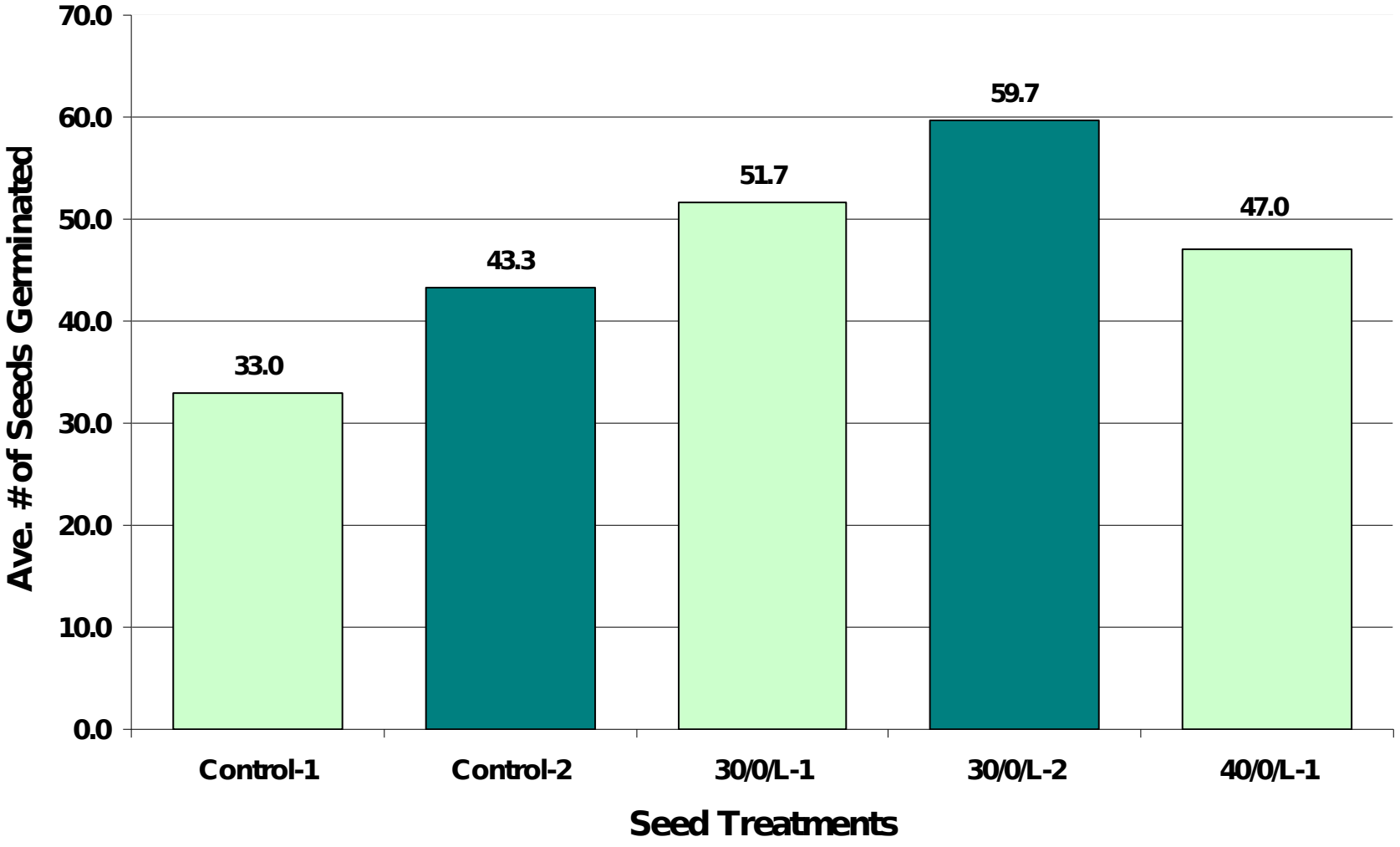
Results - Experiment 2

Impact of Cooling on Germination of *Larrea tridentata*



Results - Experiment 2

Impact of Seed Source on Germination of *Ambrosia dumosa*



Results - Experiment 3

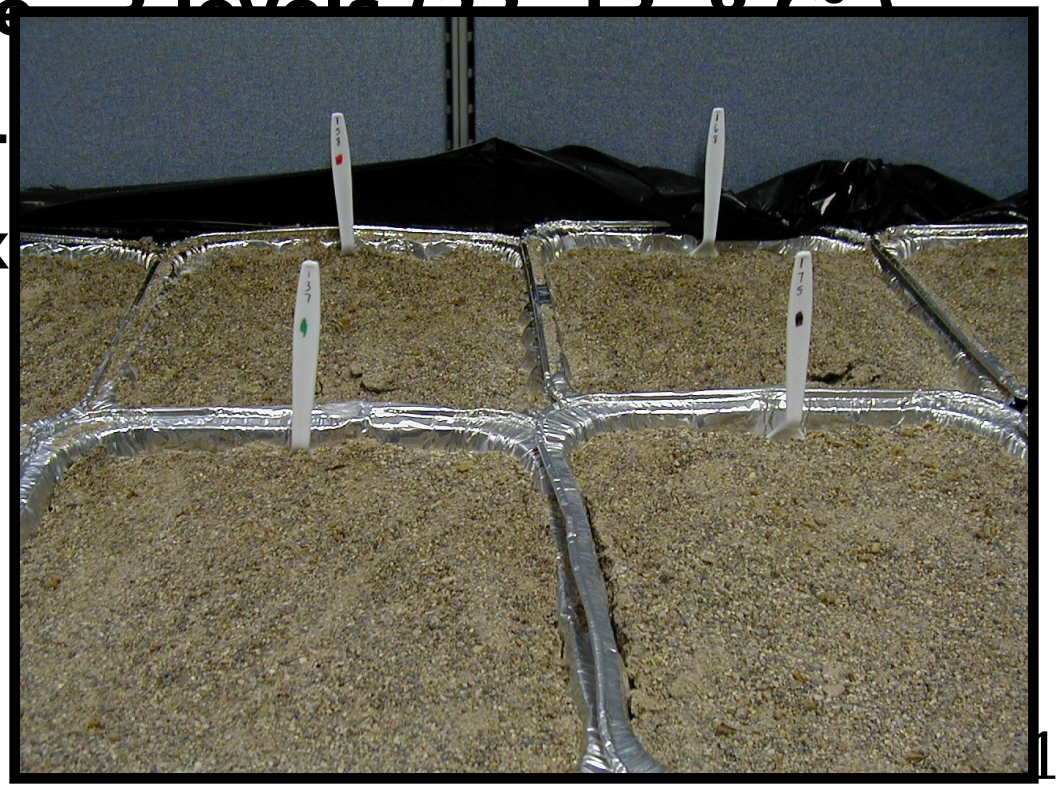
Seed Treatments - 5 levels (control, rinse 48,

rinse 48/dry 12, soak 48, soak 96)

Temperature - 3 levels (22, 13, 8 C°)

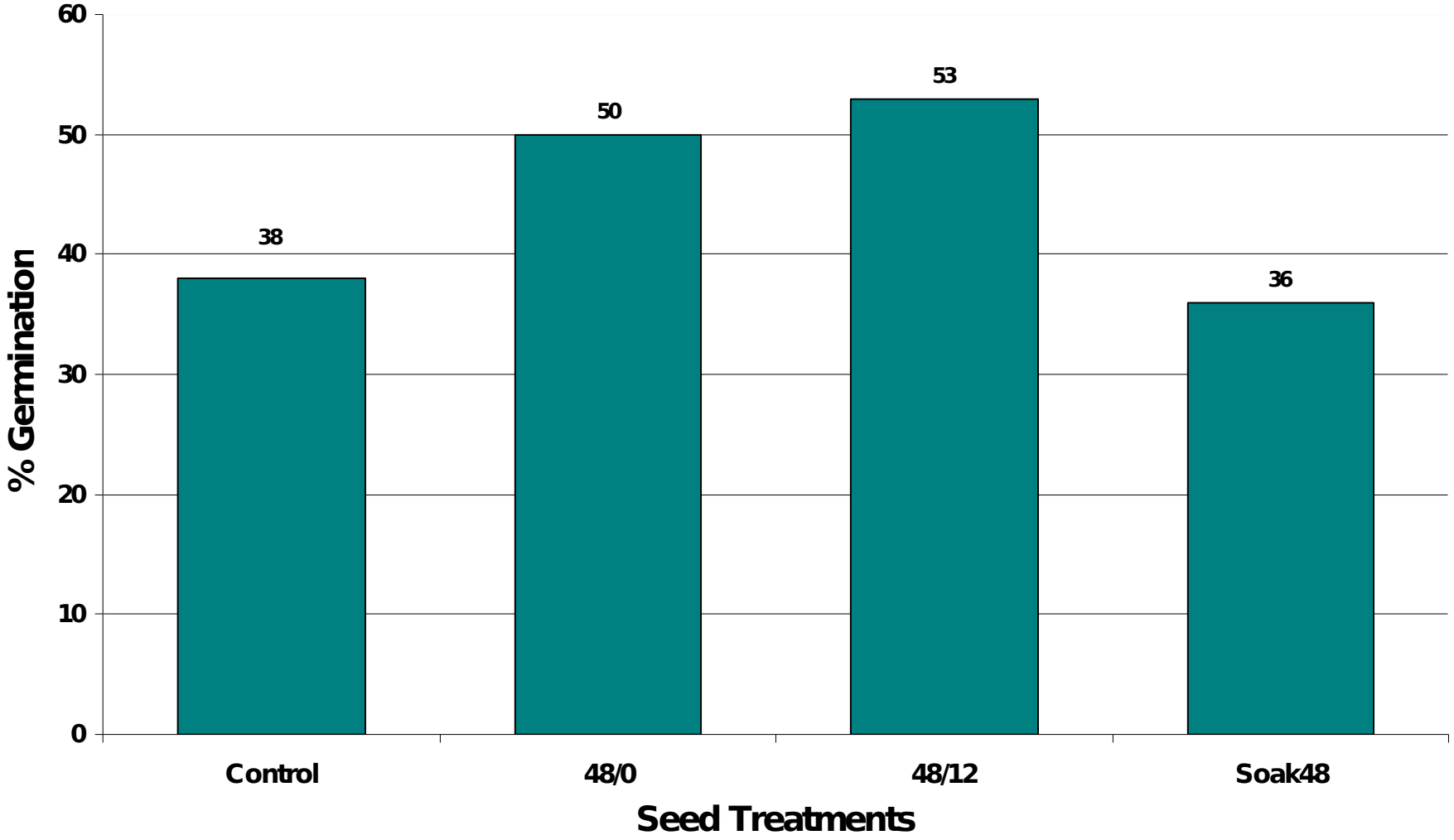
Moisture - 4

Sand Matrix



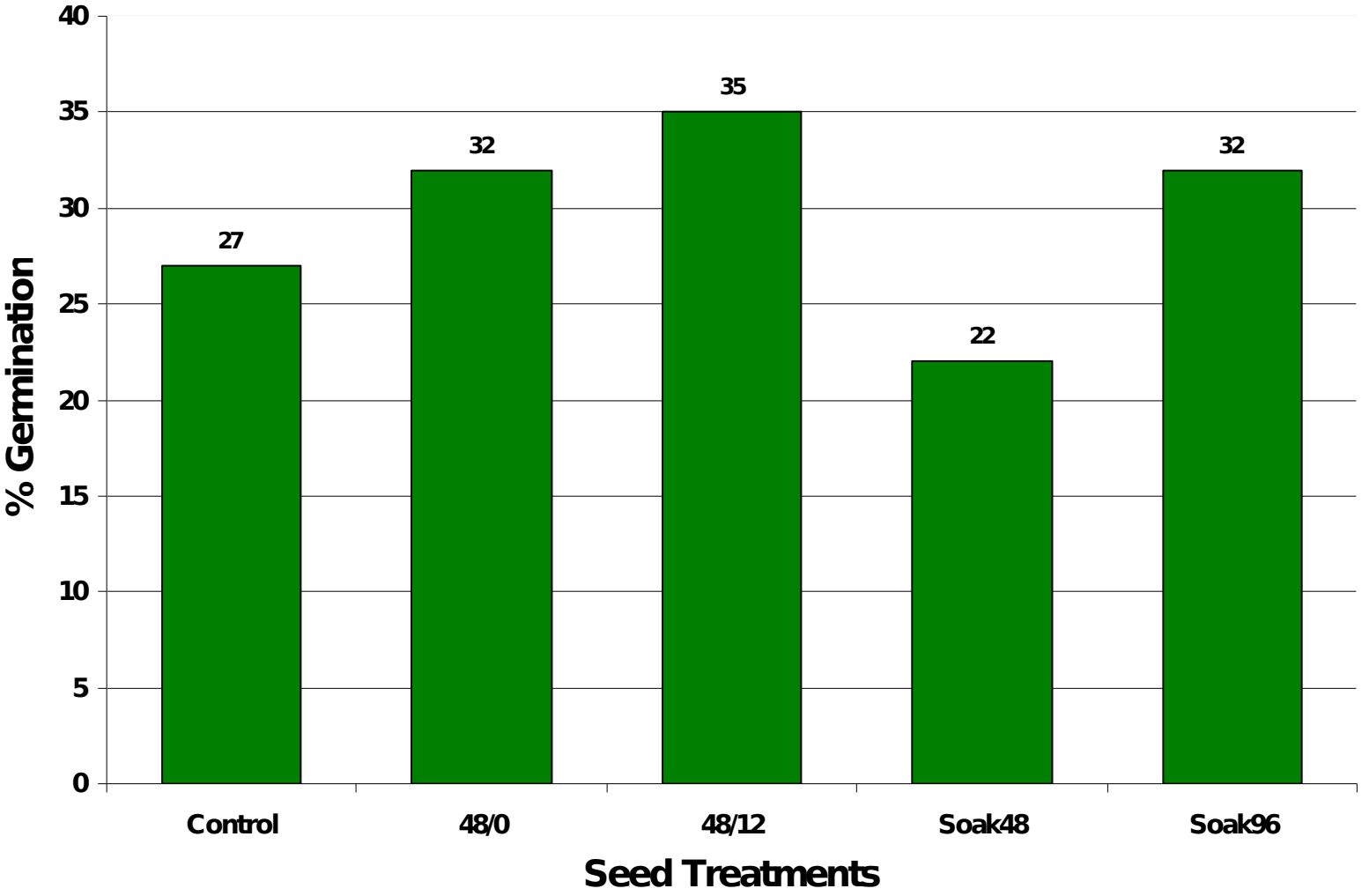
Results - Experiment 3

Germination of *Ambrosia dumosa* at 22° C



Results - Experiment 3

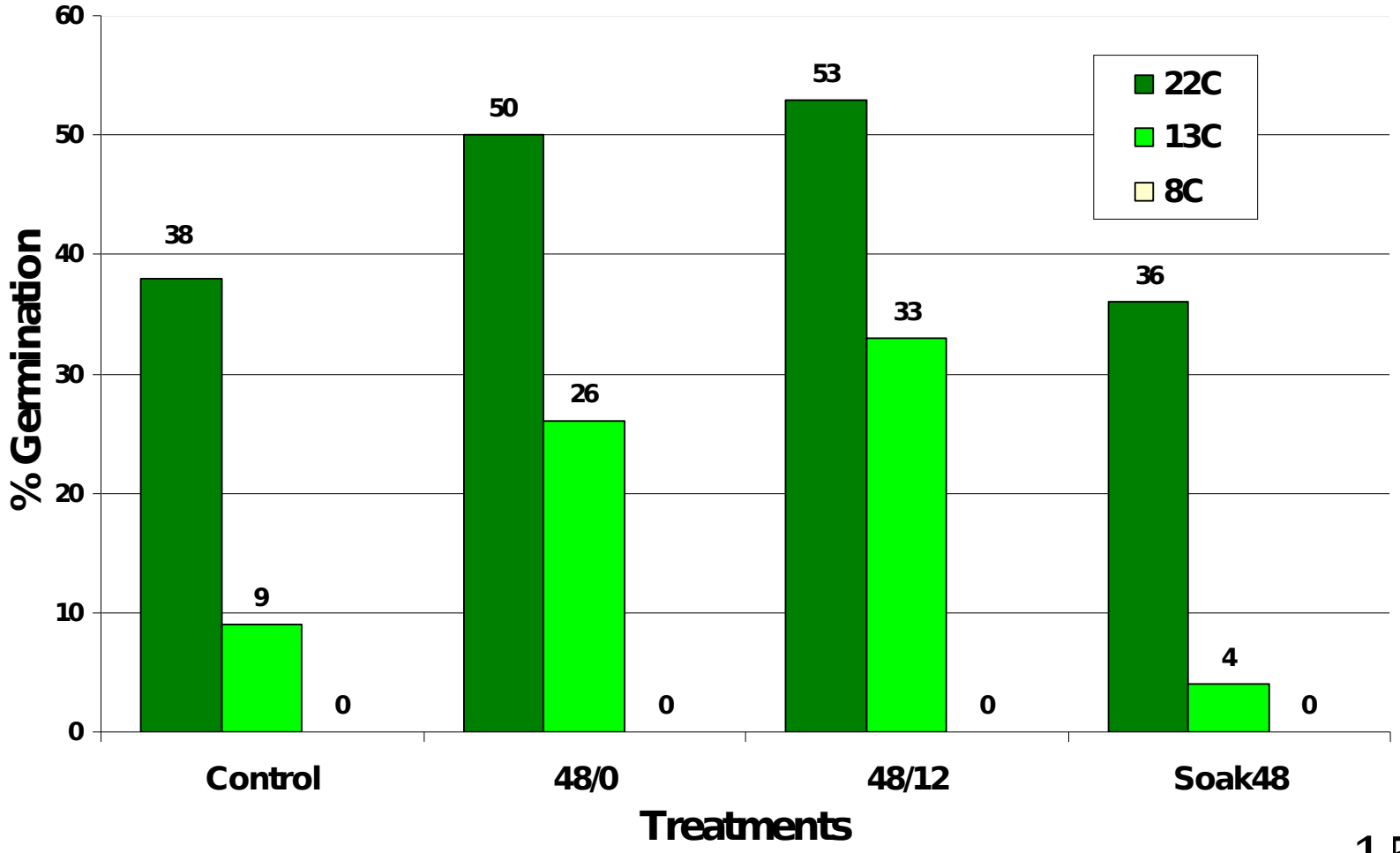
Percent Germination of *Larrea tridentata* at 22° C



Results - Experiment 3

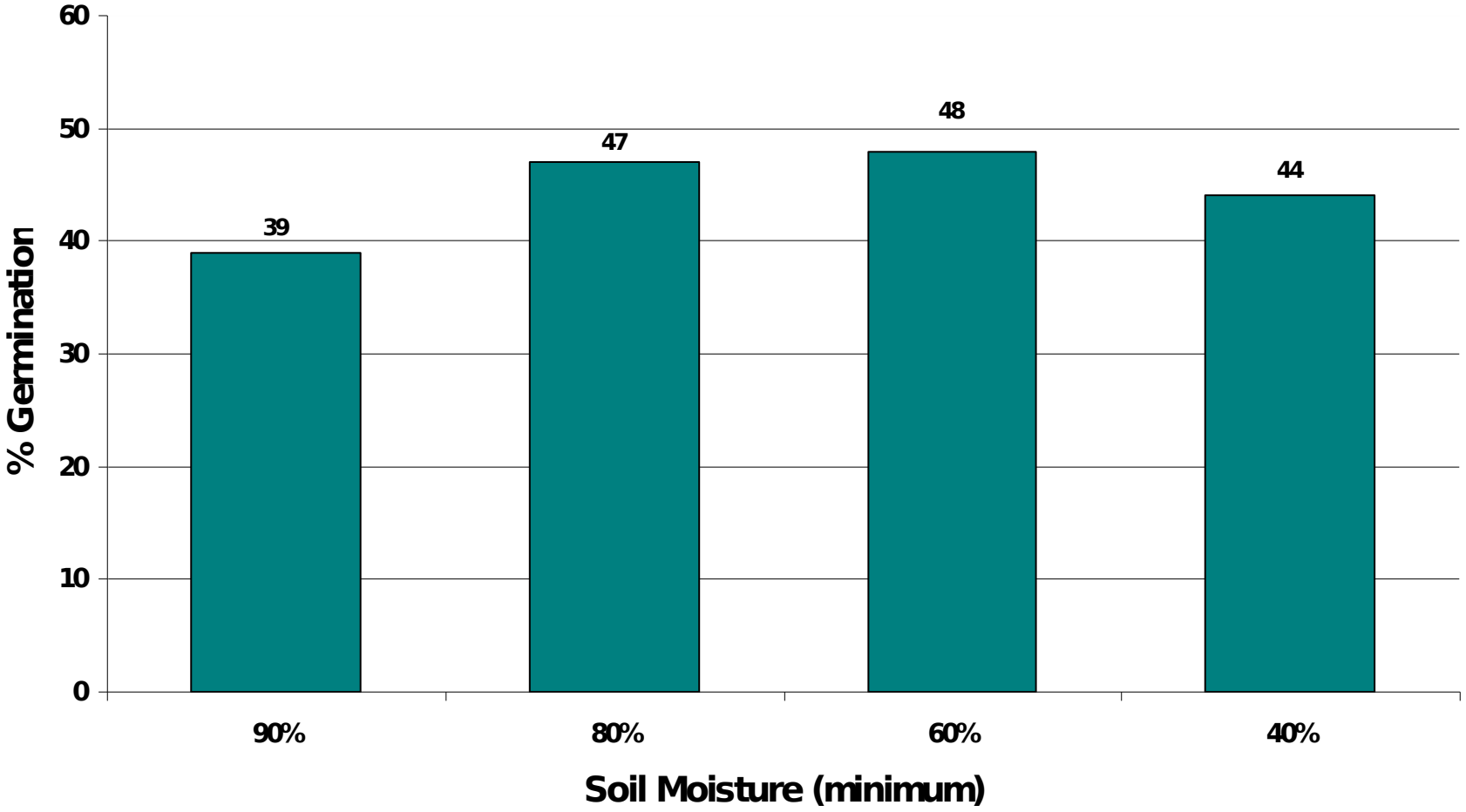
Temperature impact on Germination

Ambrosia dumosa



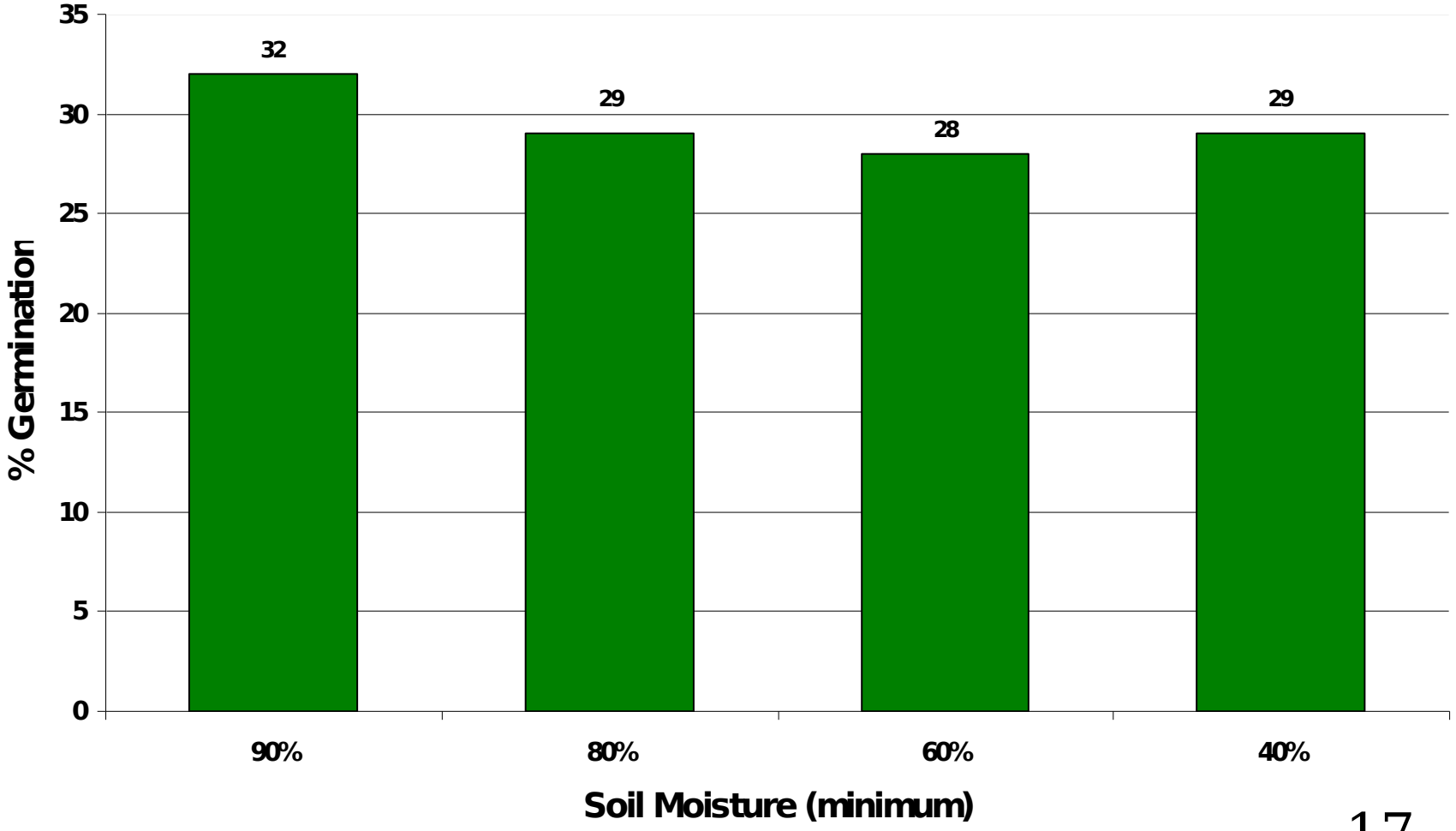
Results - Experiment 3

Soil Moisture Impact on Germination of *Ambrosia dumosa* at 22° C



Results - Experiment 3

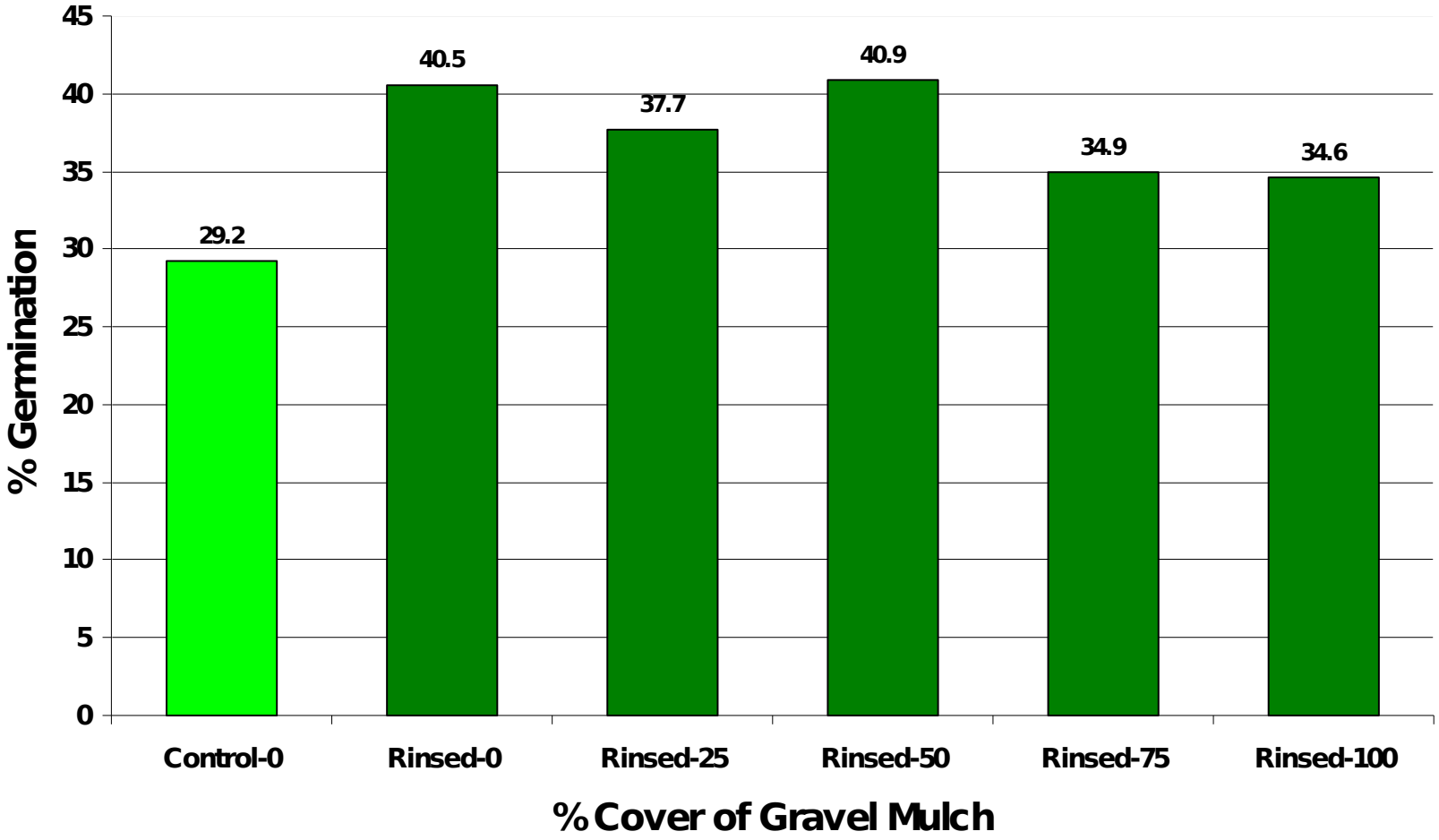
Soil Moisture Impact on Germination of *Larrea tridentata* at 22° C



Results - Experiment 4
Gravel Mulch

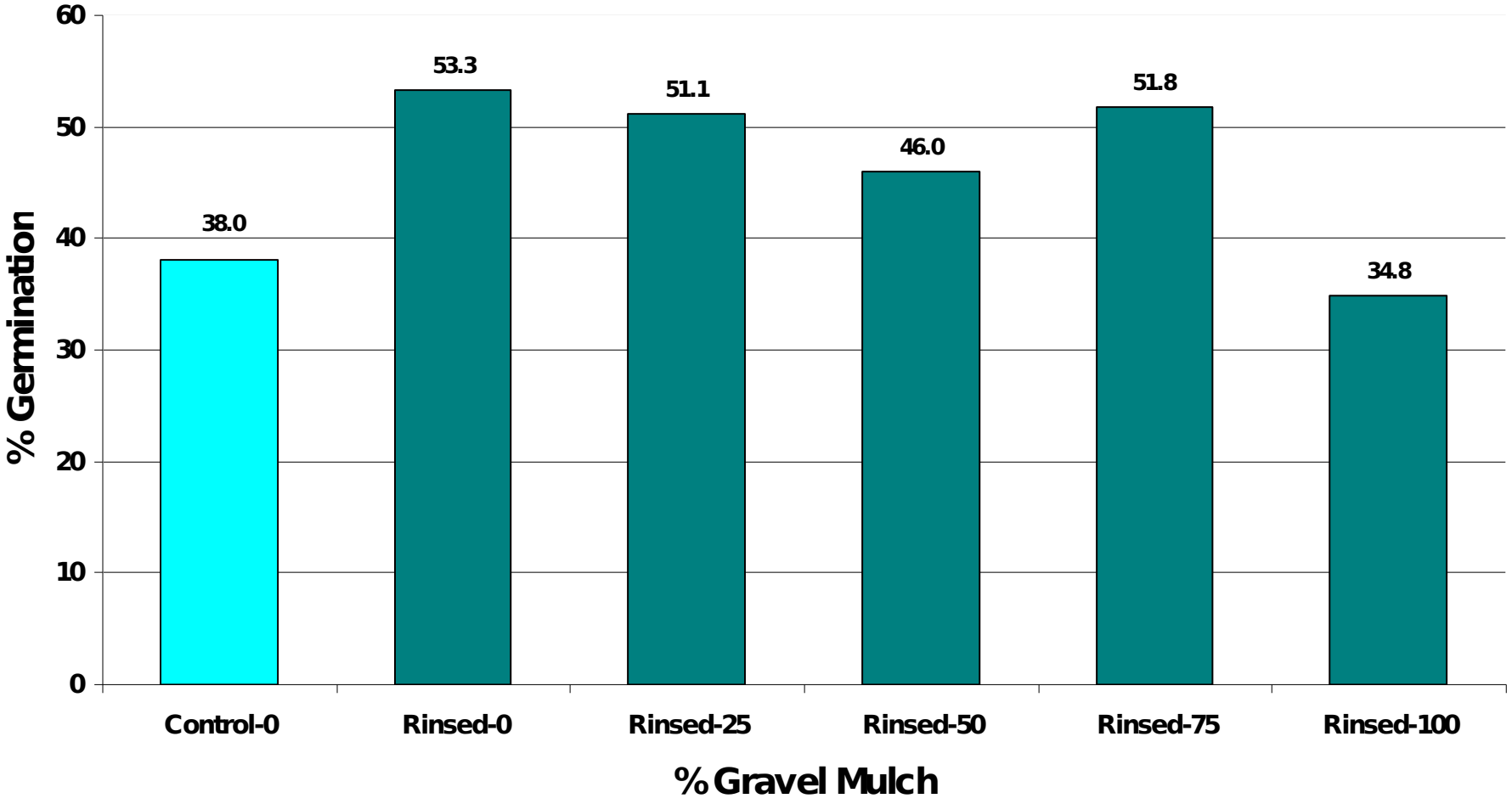
Results - Experiment 4

Gravel Mulch Impacts on Germination of *Larrea tridentata*



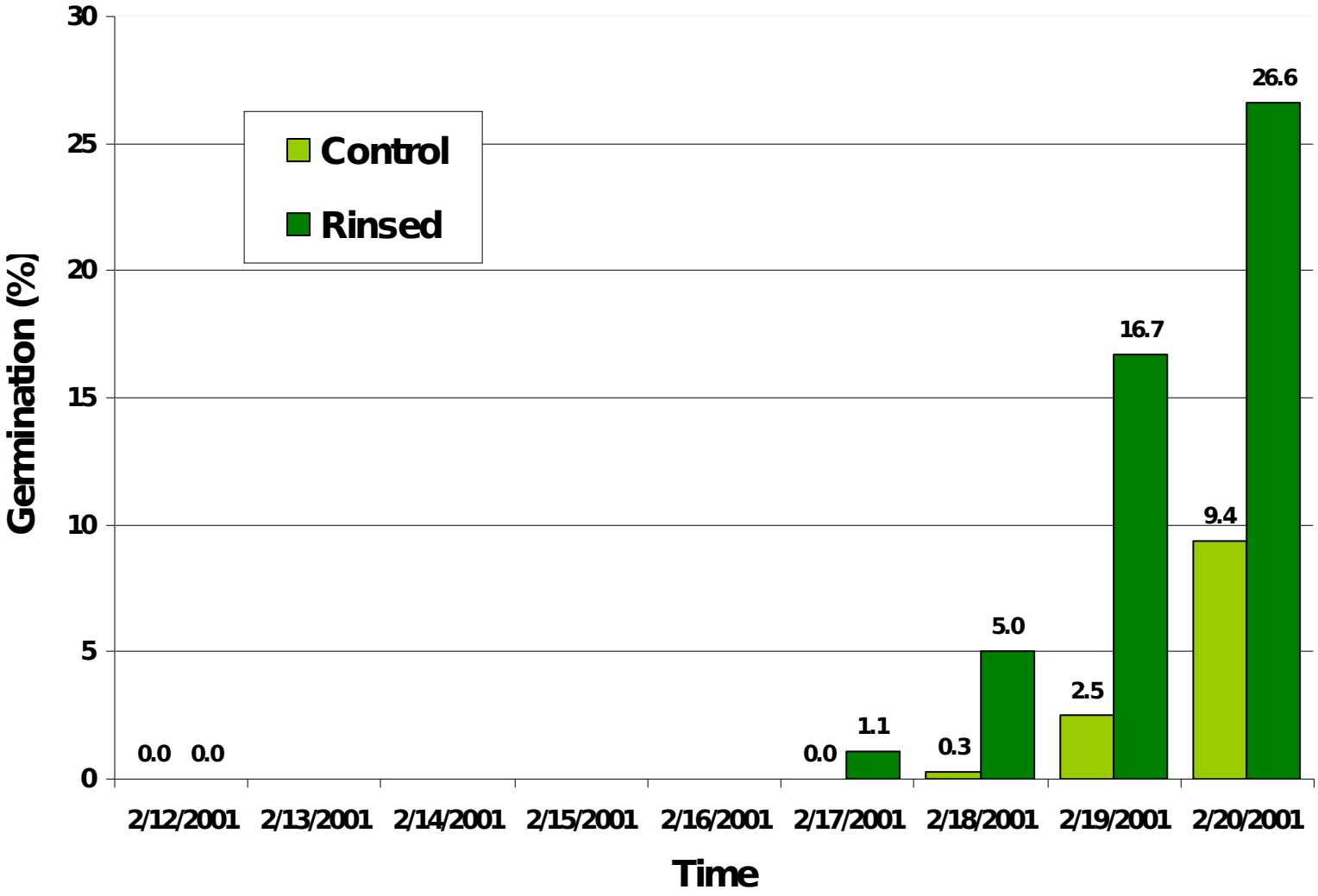
Results - Experiment 4

Gravel Mulch Impact on Germination of *Ambrosia dumosa*



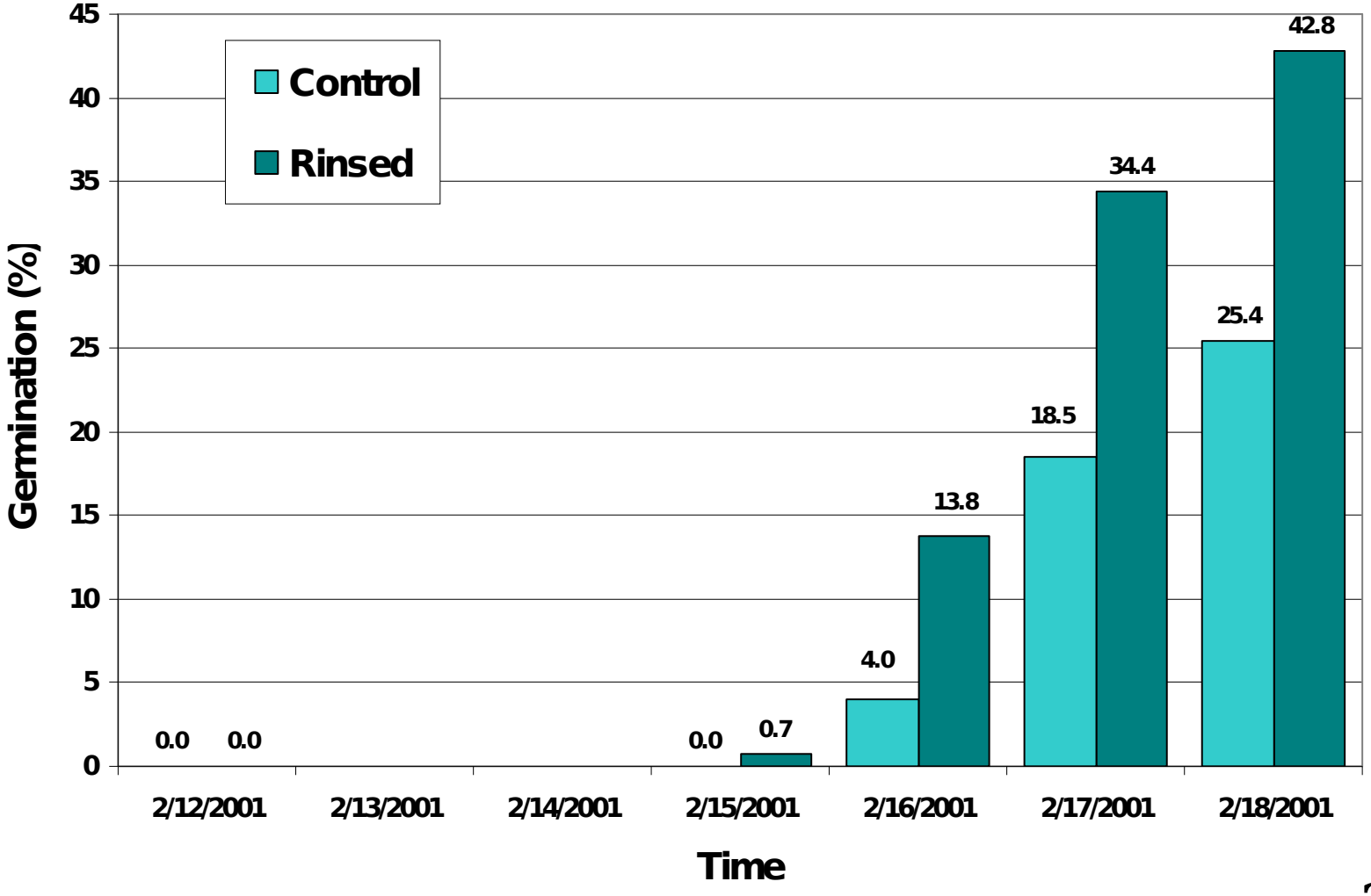
Results - Experiment 4

Timing of Germination of *Larrea tridentata*



Results - Experiment 4

Germination of *Ambrosia dumosa*



Results - Field Trials

Seed Treatments 2 levels (control, rinsed 48hrs/dried 2hrs)

Mulch - 5 levels (gravel, straw, bare, stabilizer, plastic)

Soils - 2 levels (Lang

Temperature - 2 lev

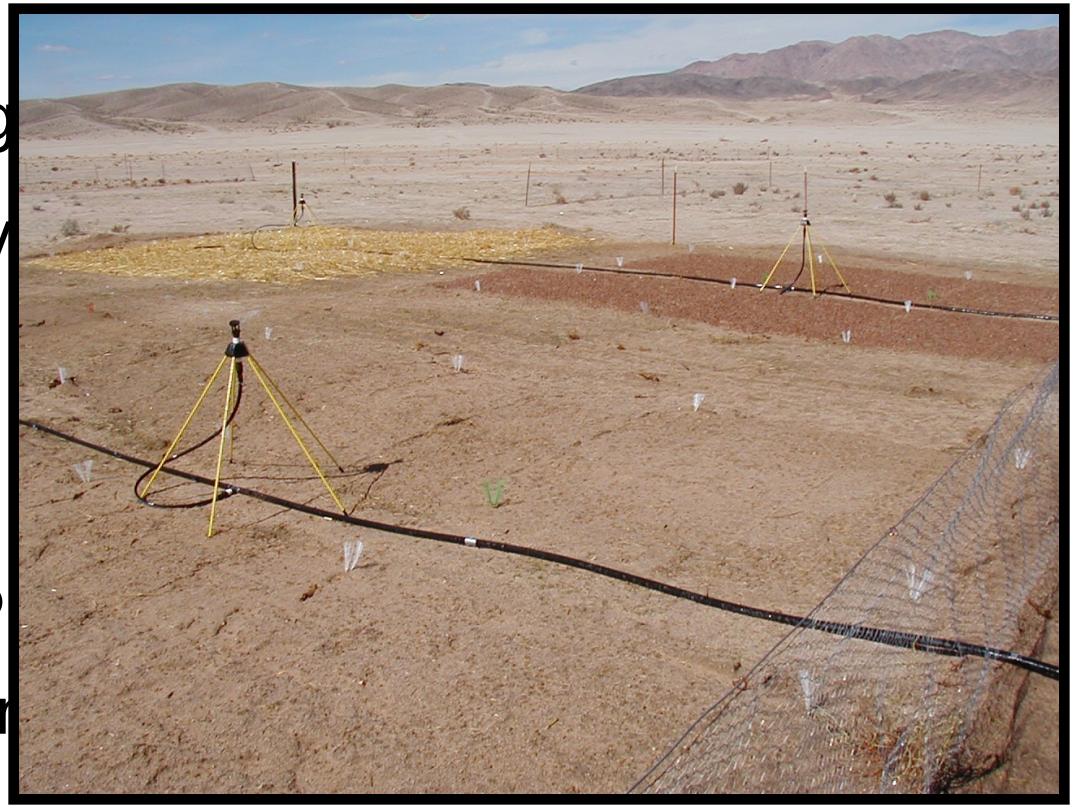
12-17° C - March,

15-30° C - April

Seeded Species - 5

(Latr, Amdu, Enfa, Plr

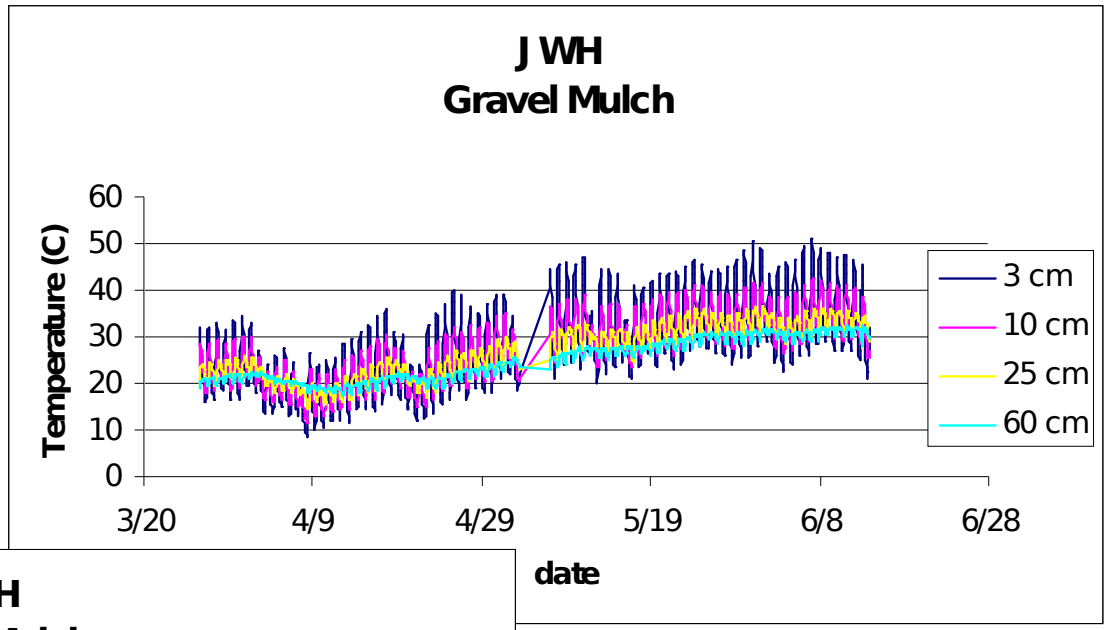
Lypa)

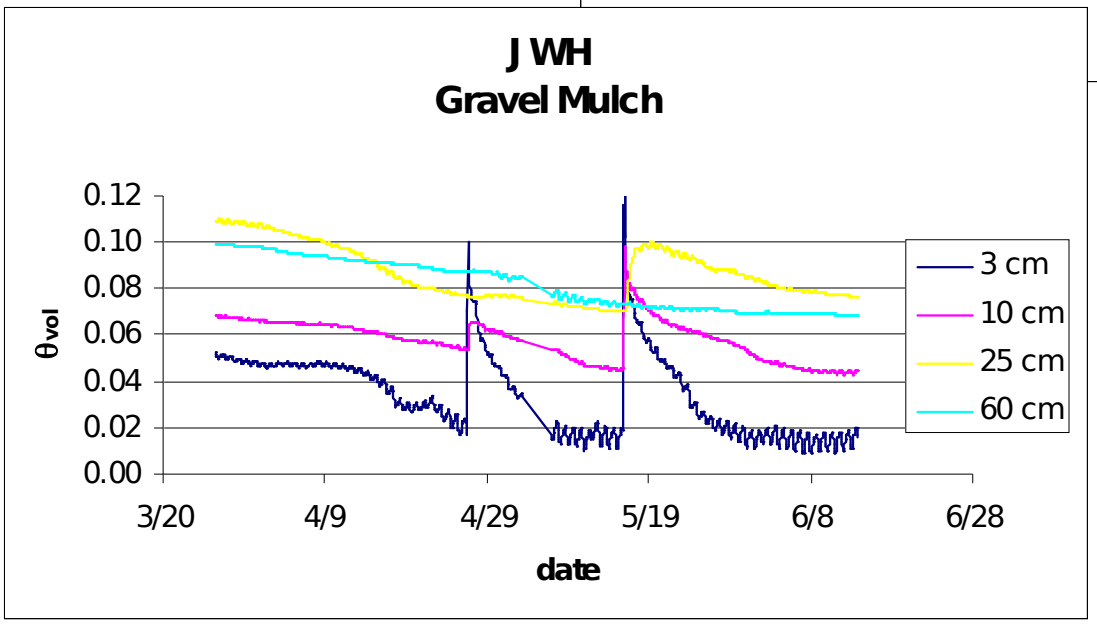


Results - Field Trials

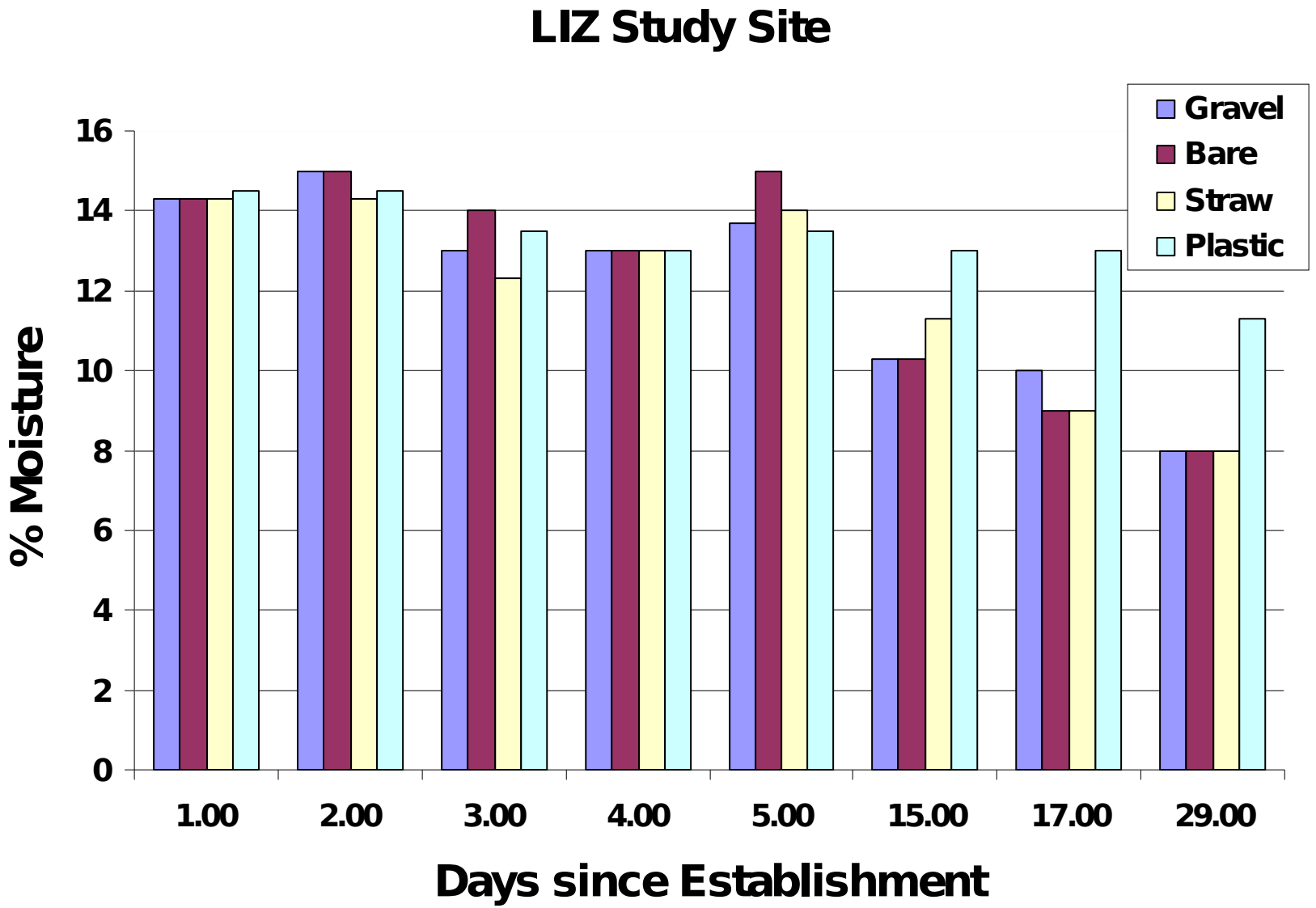
Instrumented for Moisture and Temperature

Results - Field Trials



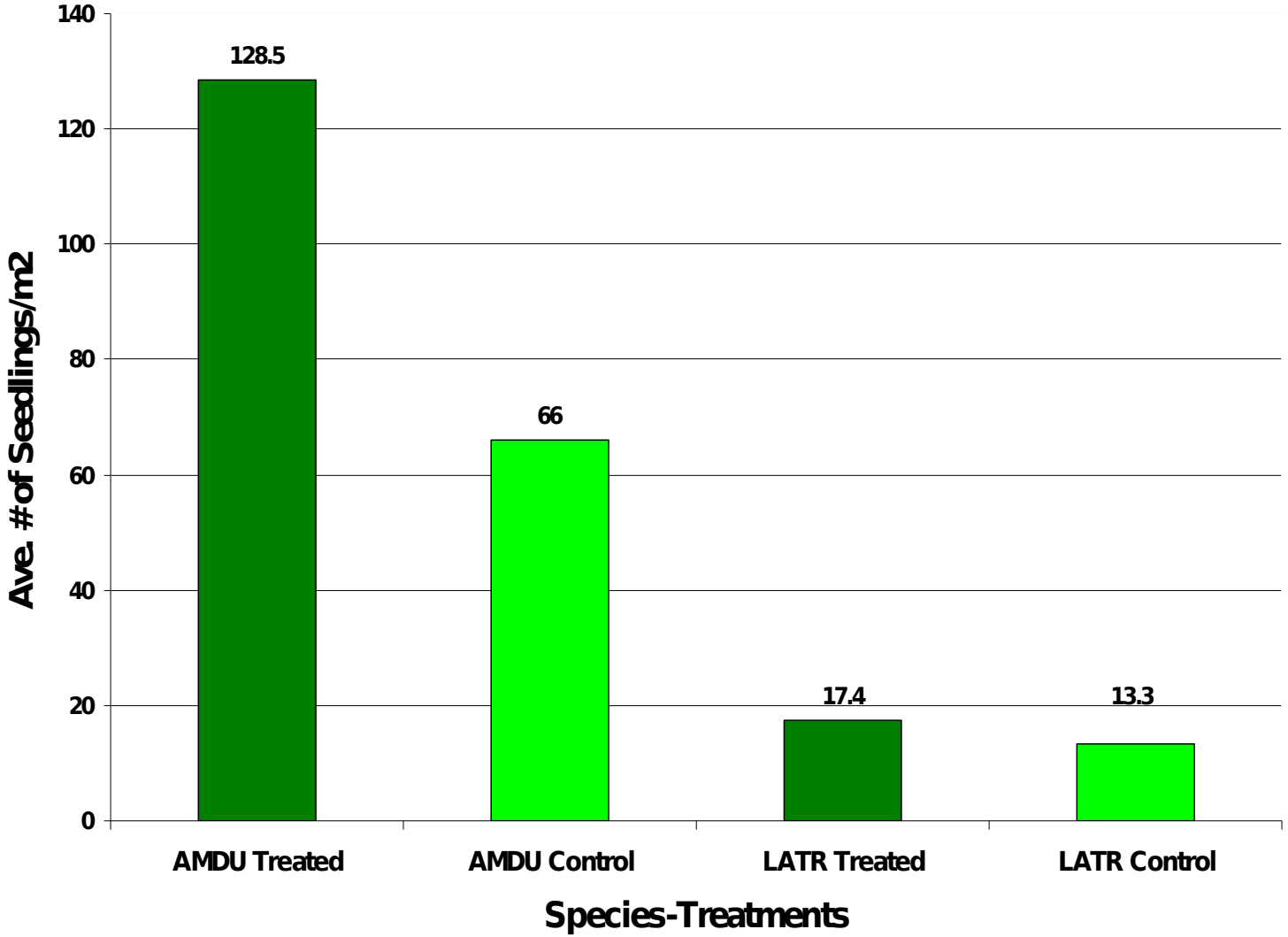


Results - March Field Trials

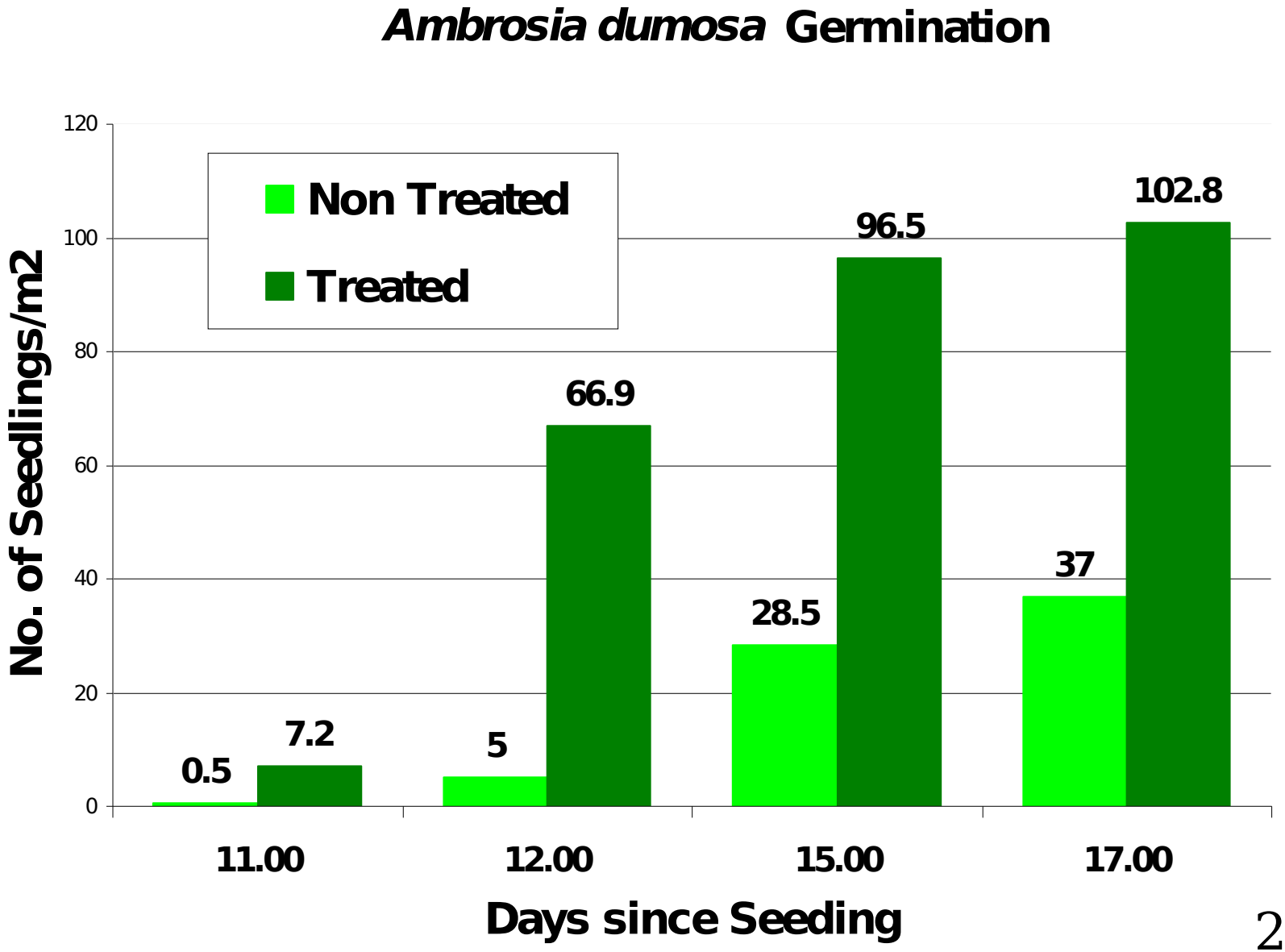


Results - March Field Trials

Effects of Treated Seed on Germination



Results - March Field Trials



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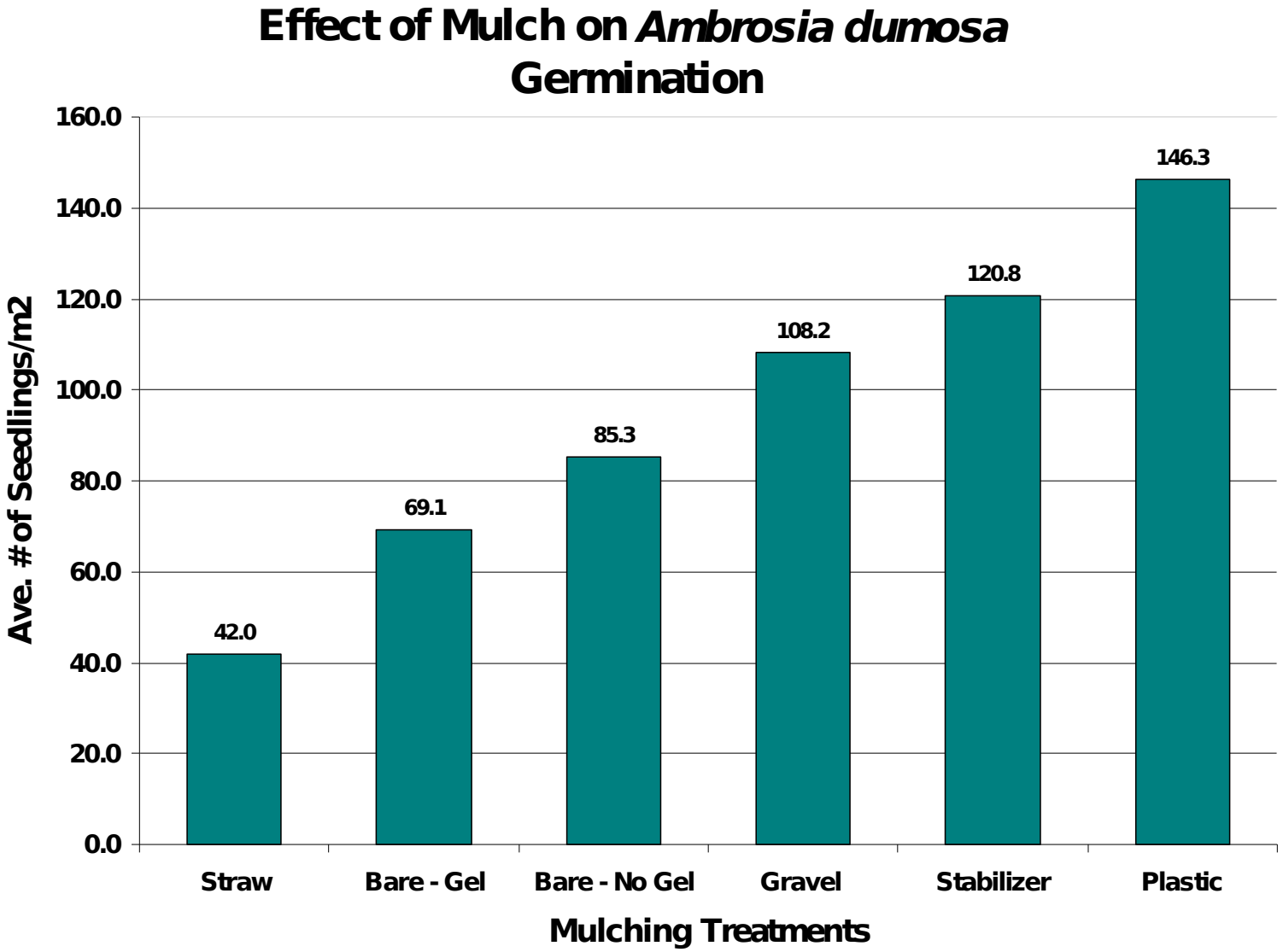
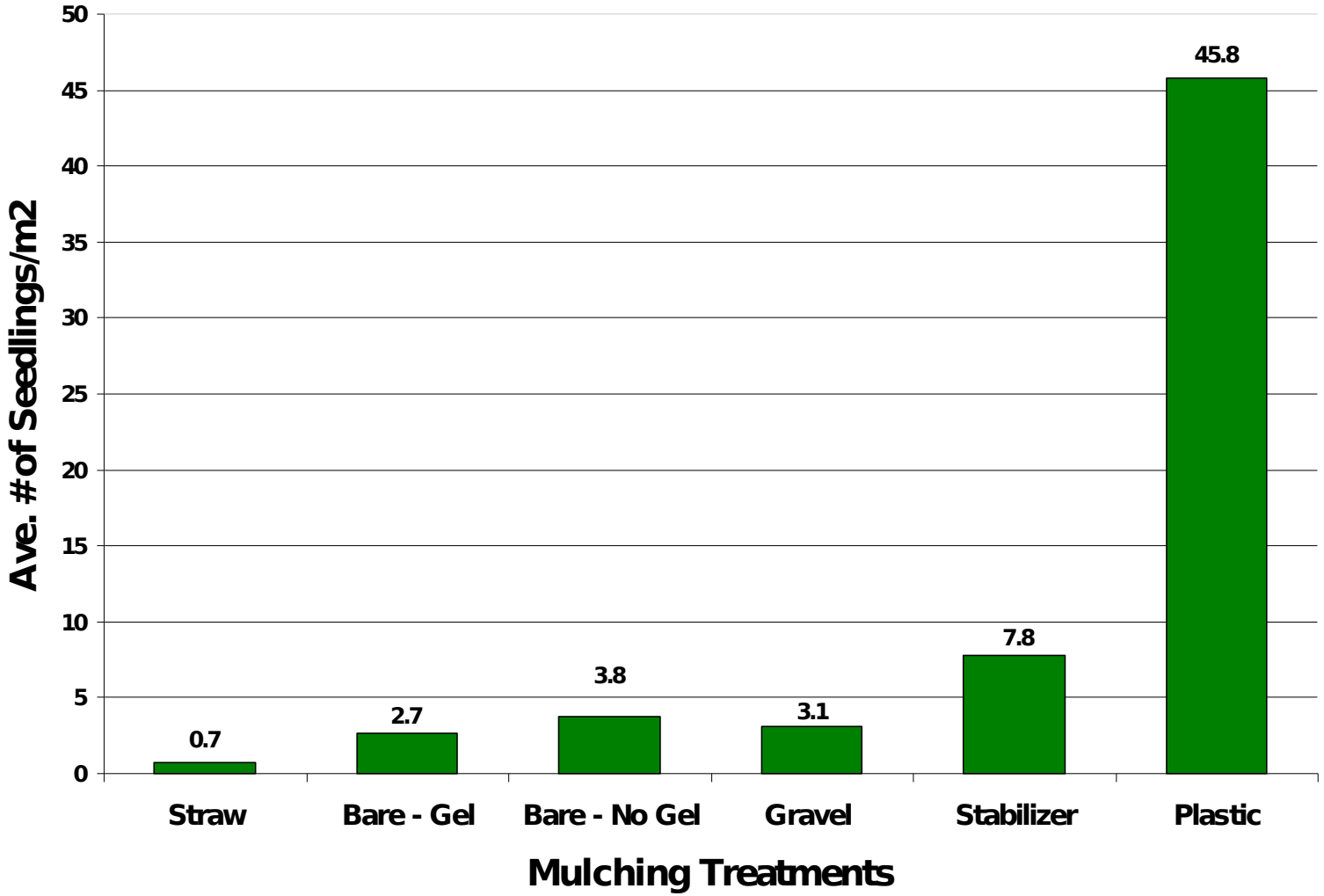


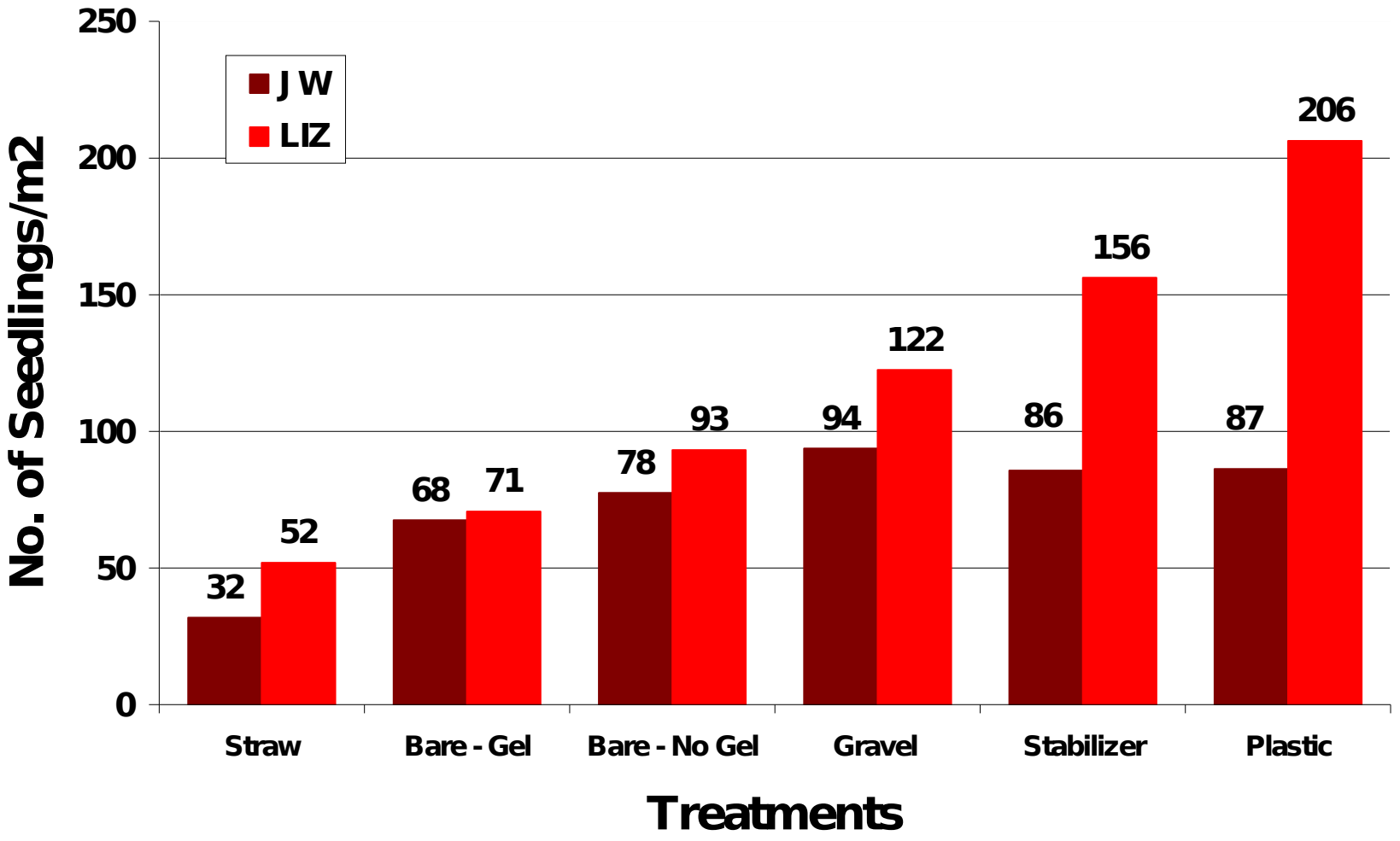
Results - March Field Trials

Effect of Mulch on *Larrea tridentata* Germination



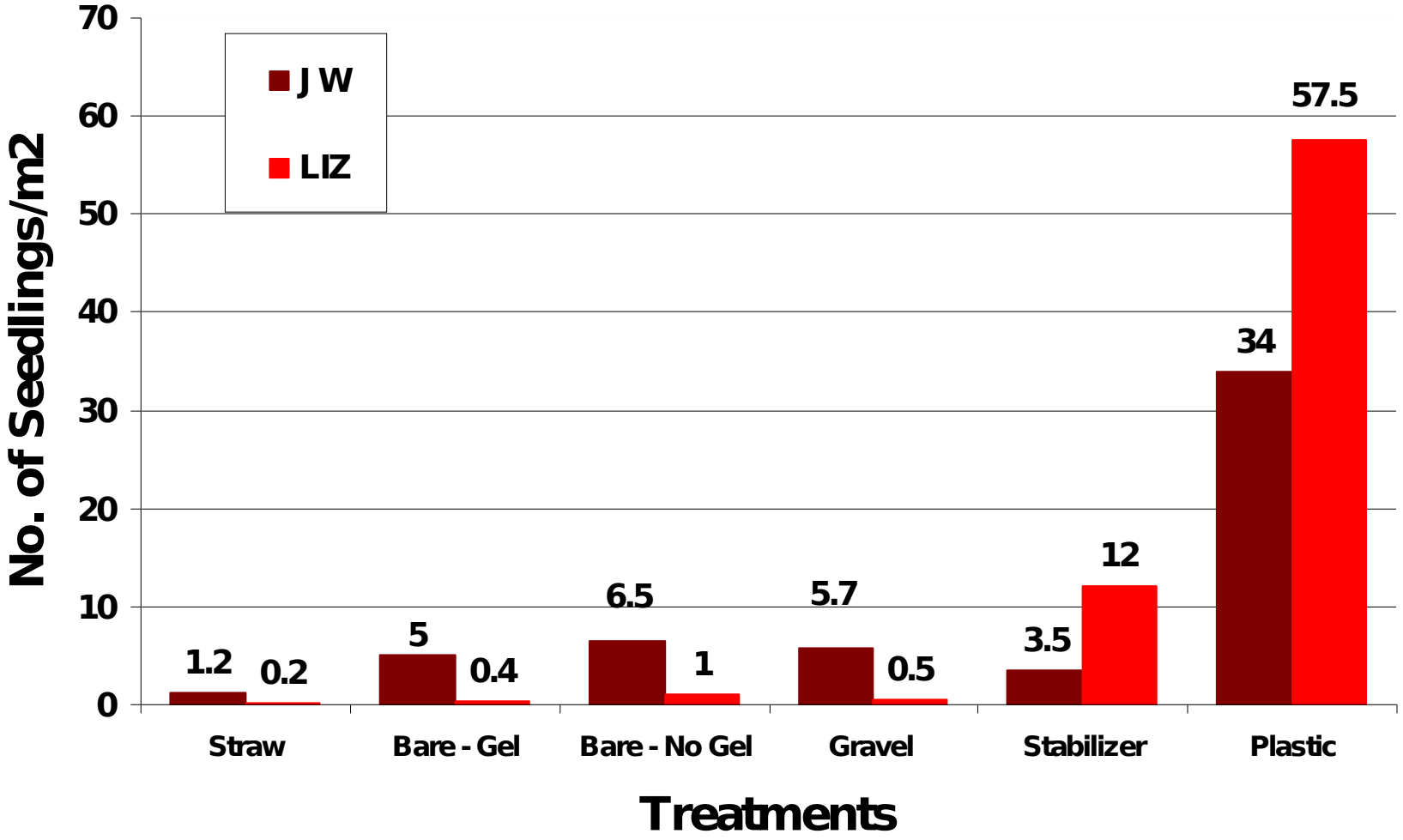
Results - March Field Trials

Effect of Soil on *Ambrosia dumosa* Germination



Results - March Field Trials

Effect of Soil on *Larrea tridentata* Germination



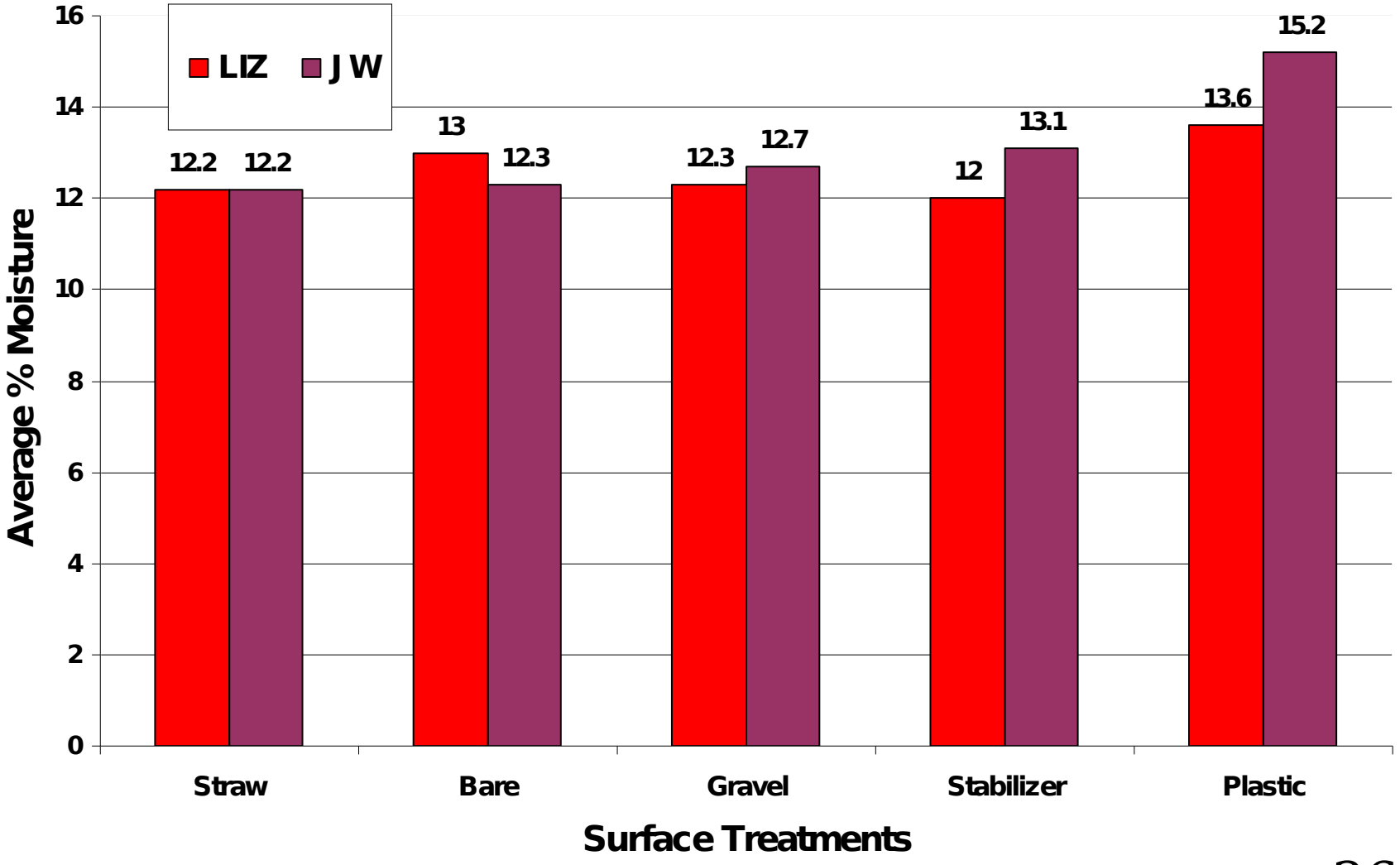
Results - April Field Trials

Seeded April 16

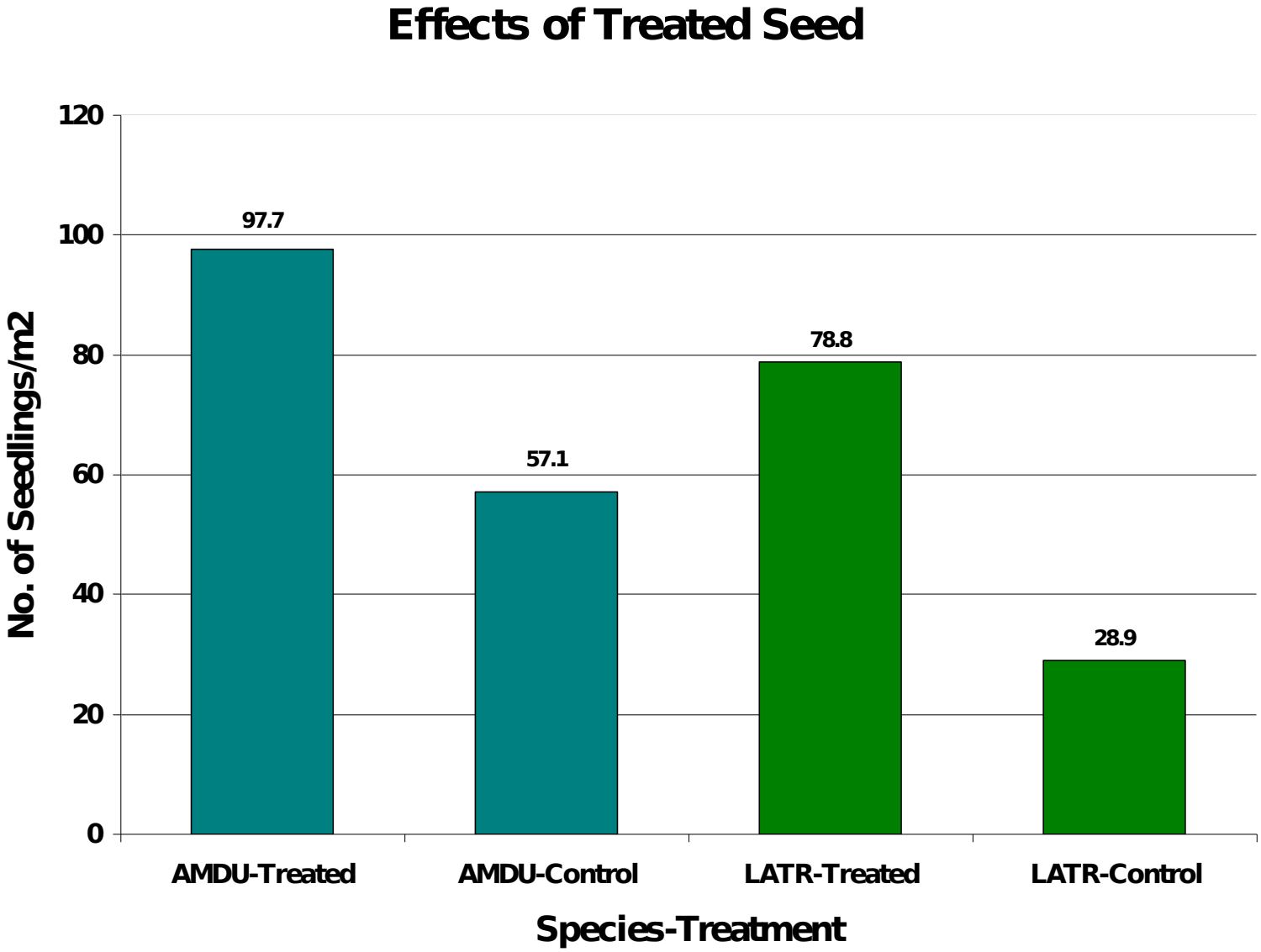
Full replications of plastic and stabilizer treatments

Results - April Field Trials

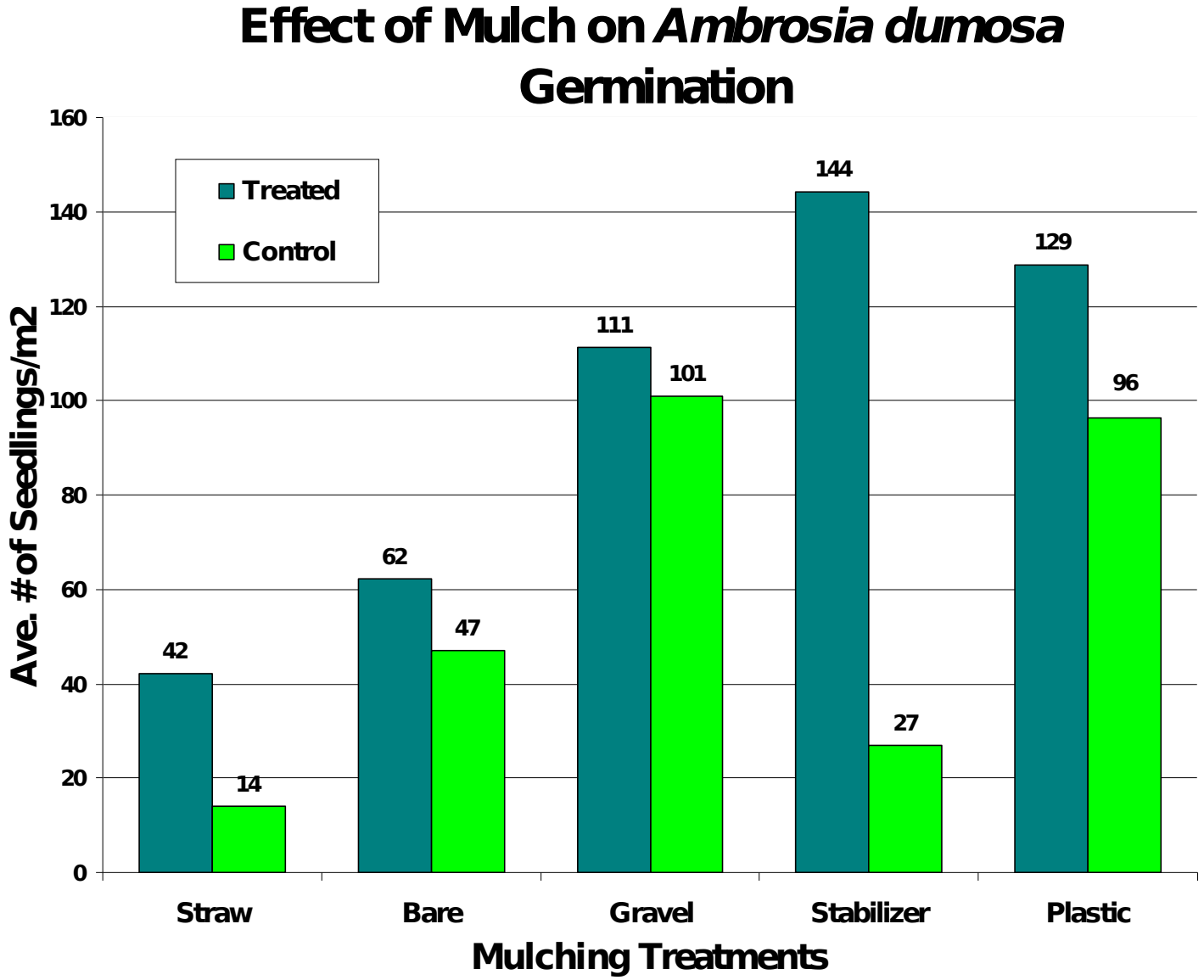
Soil Moisture during Germination



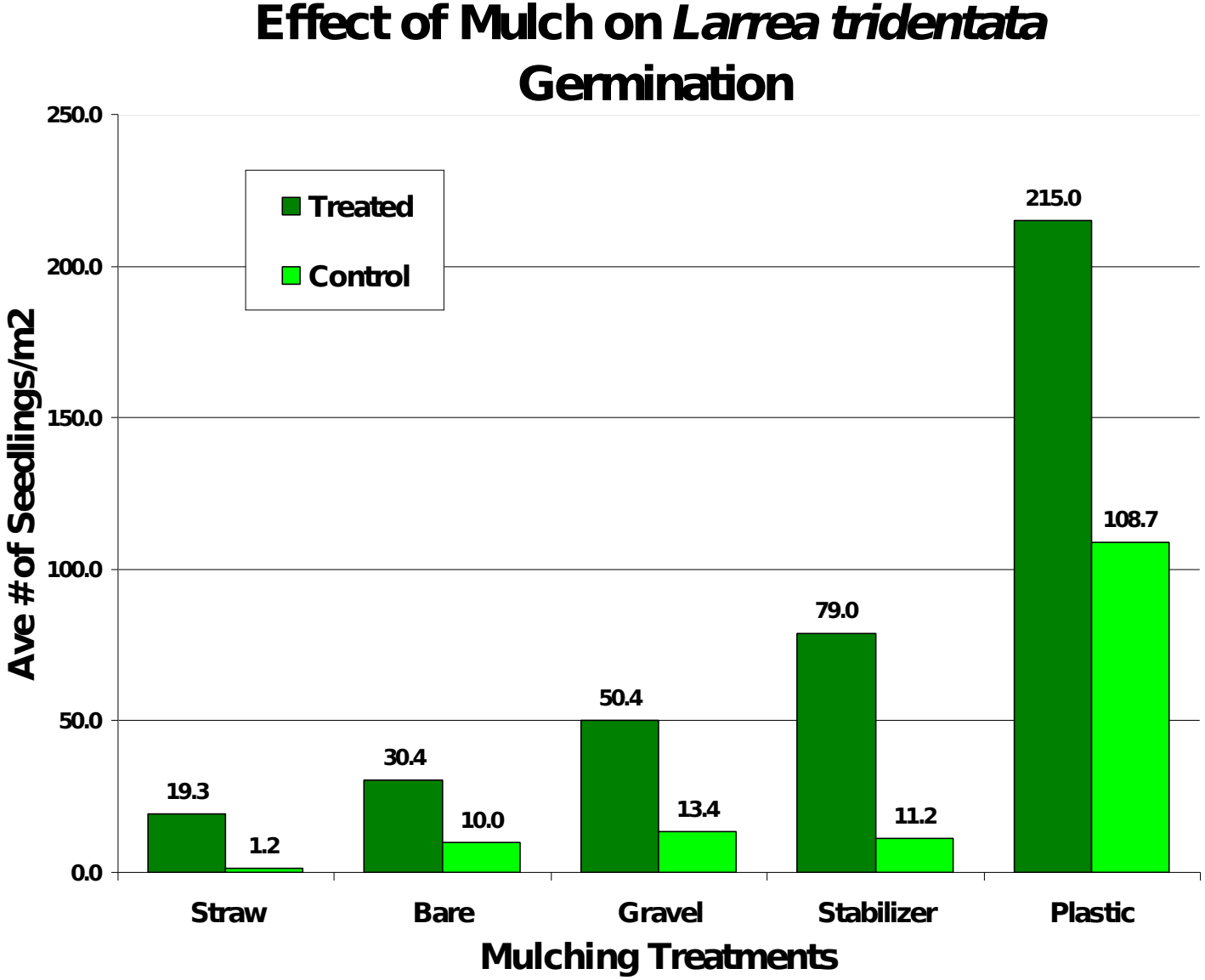
Results - April Field Trials



Results - April Field Trials



Results - April Field Trials

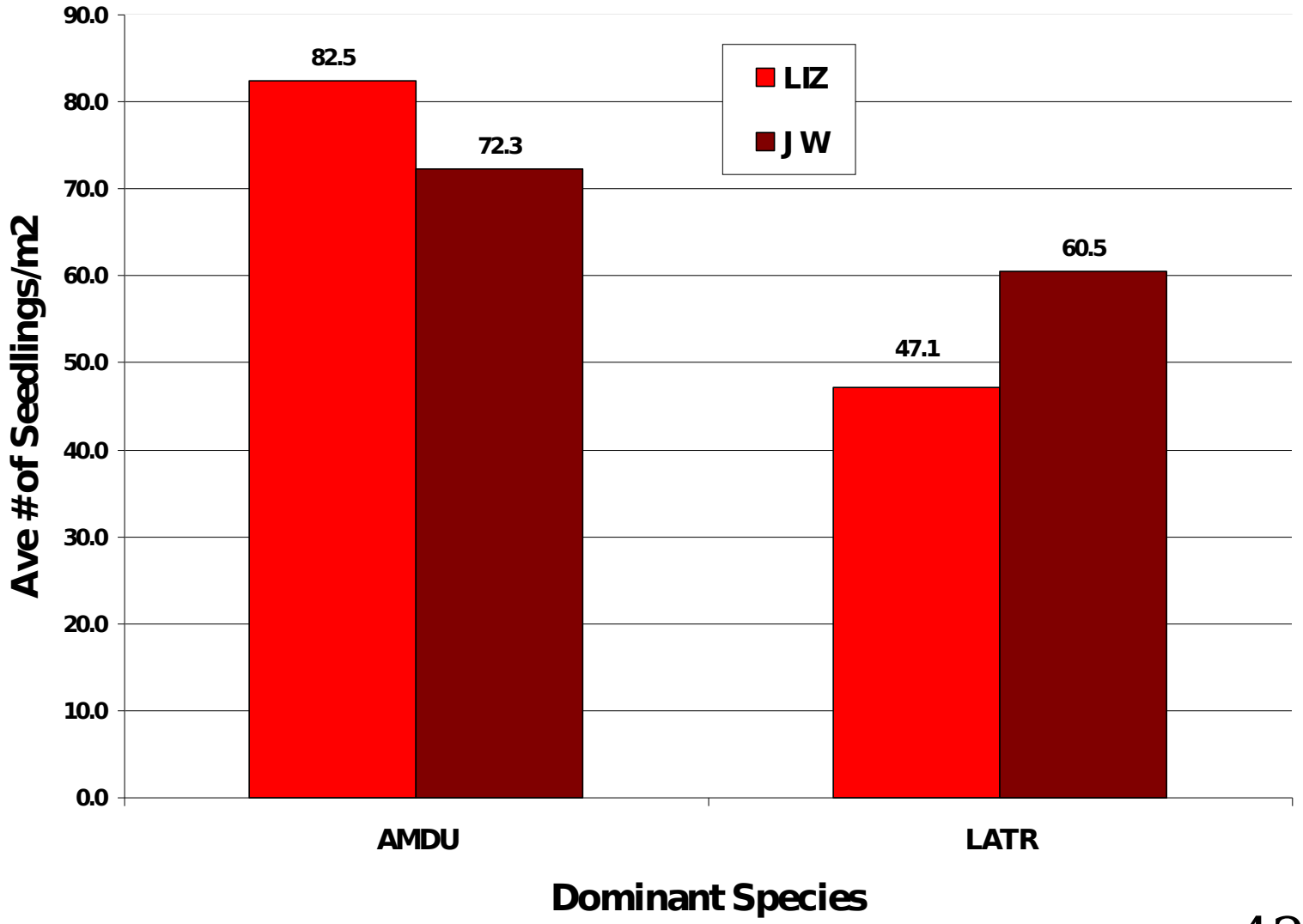


Results - April Field Trials

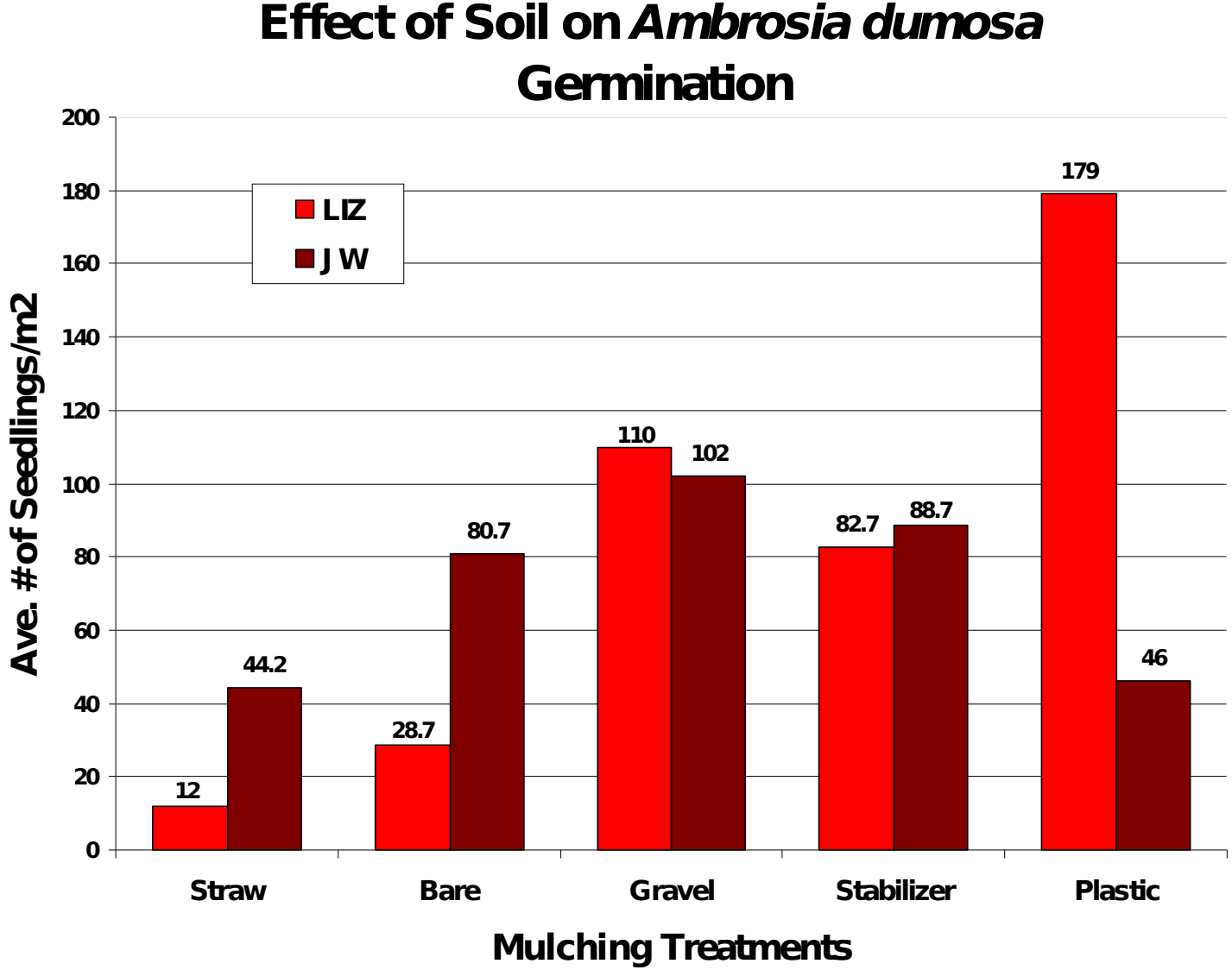
Results - April Field Trials

Results - April Field Trials

Effect of Soil on Species Germination

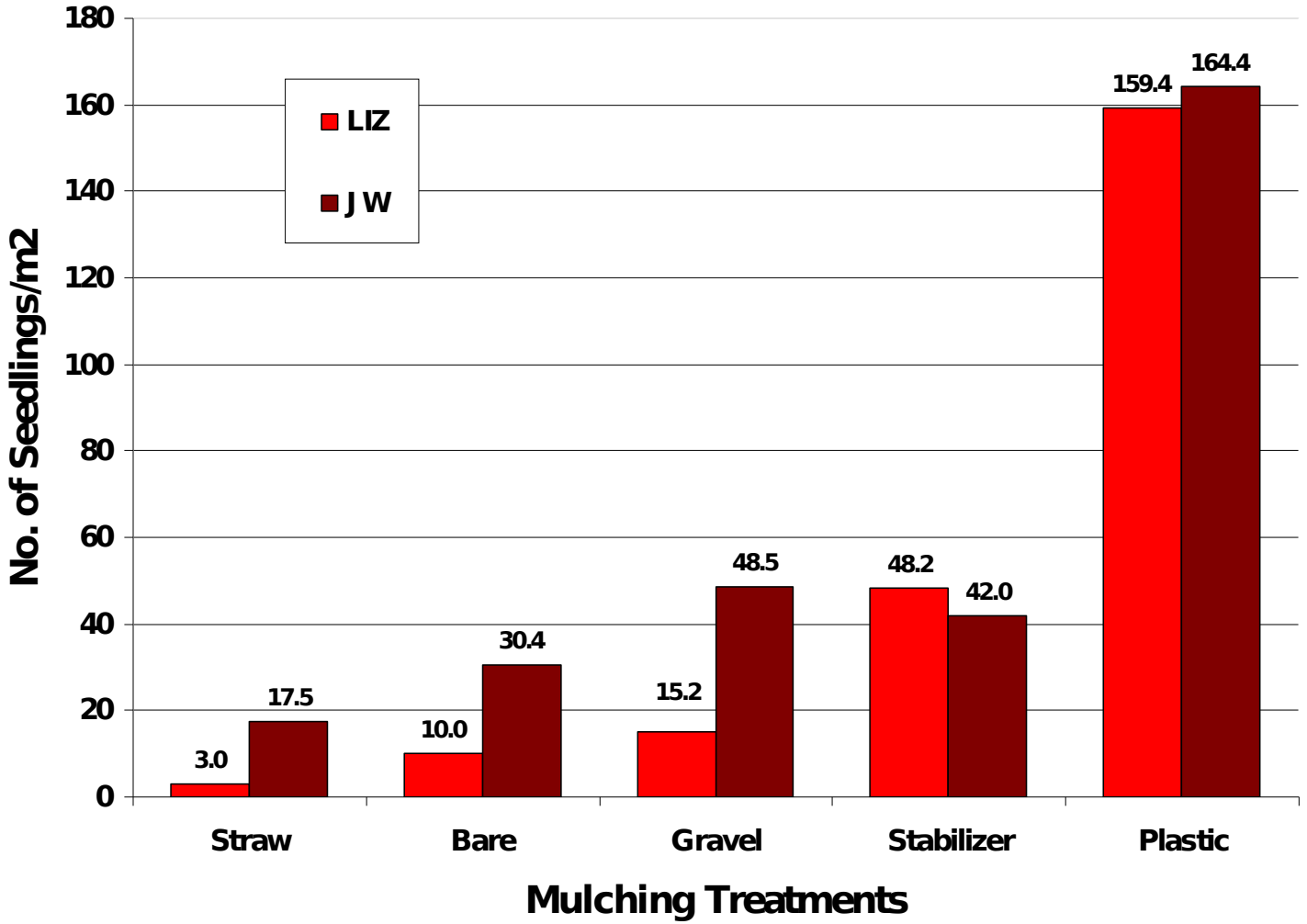


Results - April Field Trials



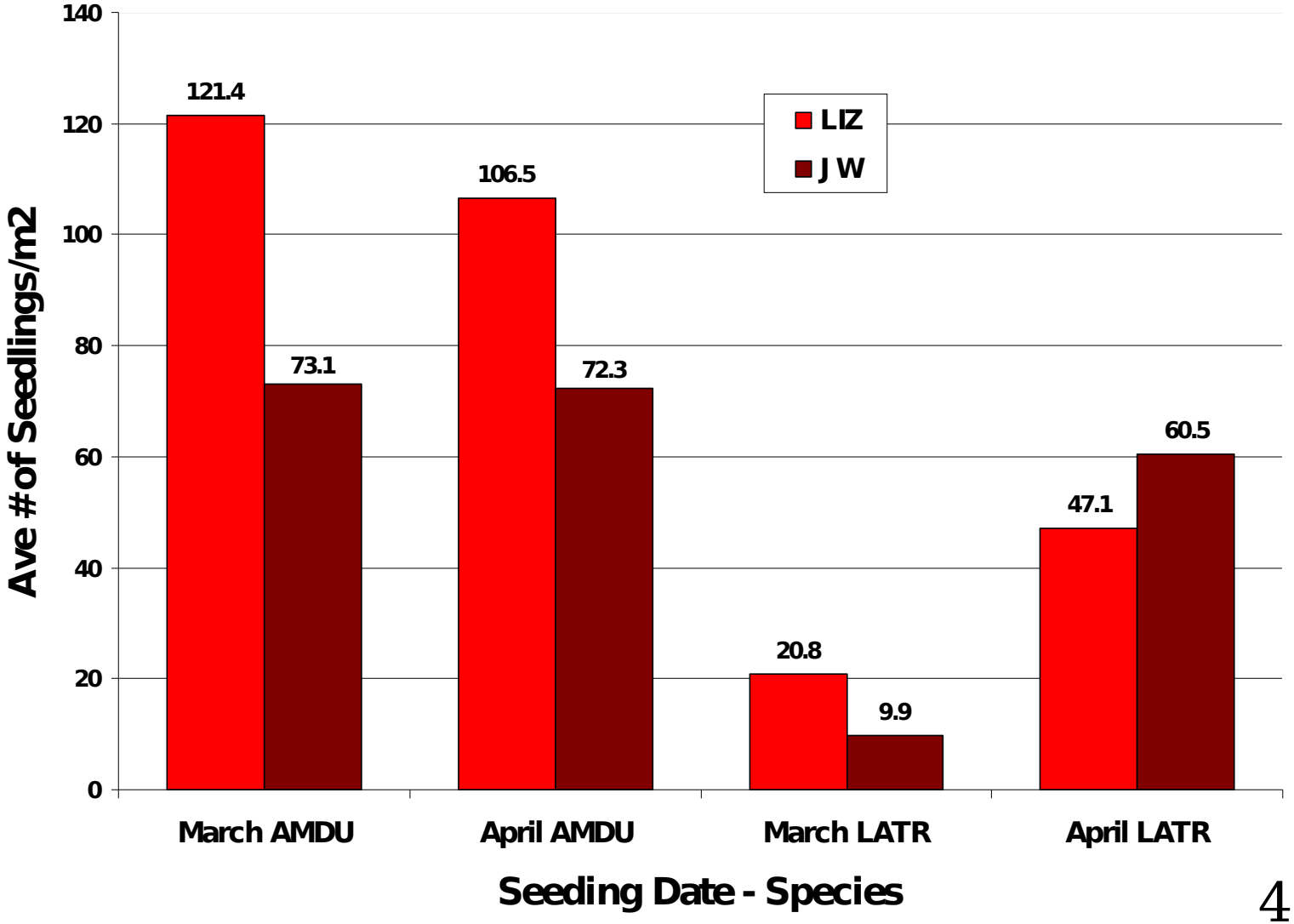
Results - April Field Trials

Effect of Soil on *Larrea tridentata* Germination



Results - Field Trials

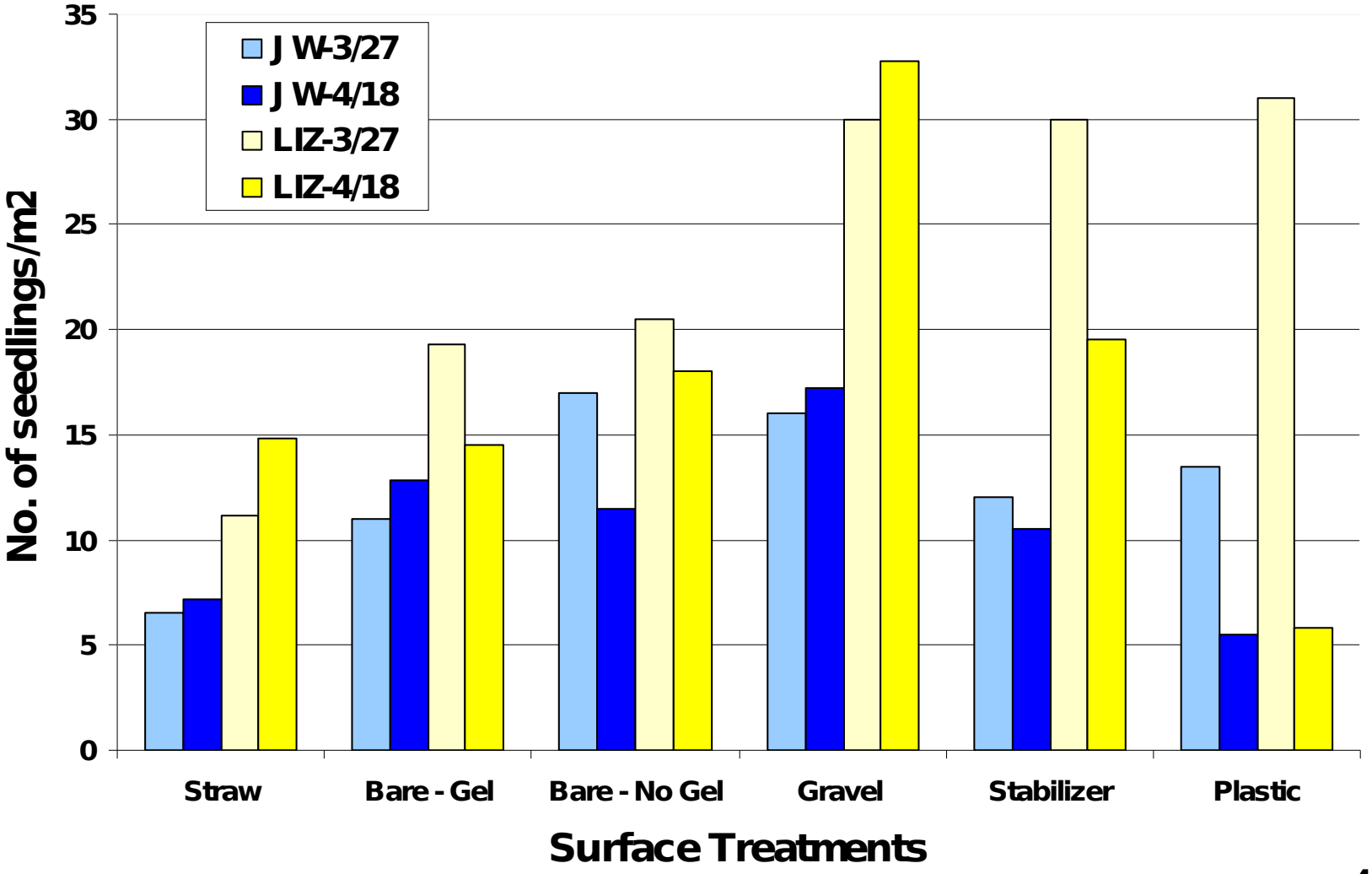
Temperature Impacts on Germination



Results - Field Trials

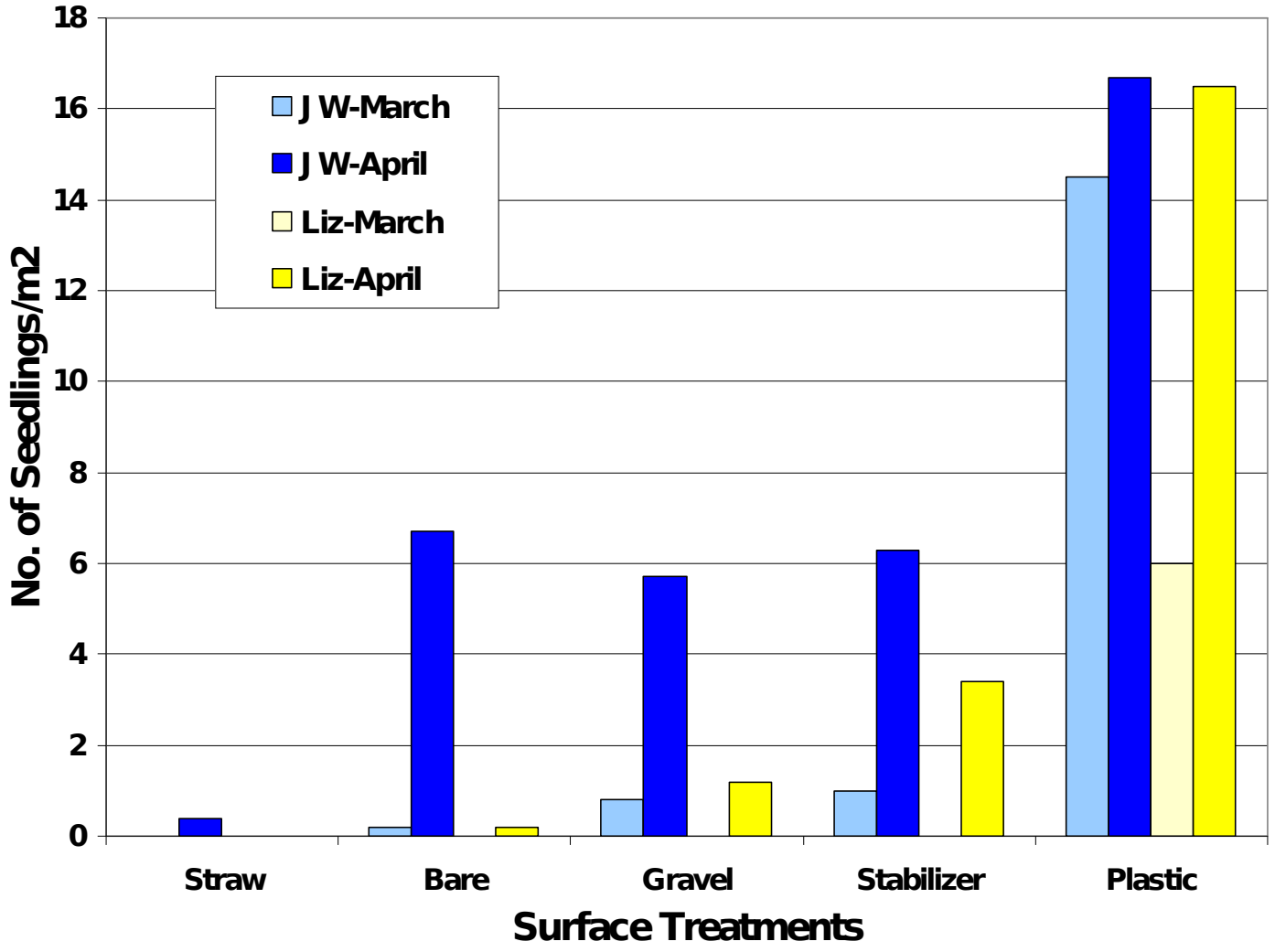
Results - Field Trials

Encelia farinosa Germination



Results - Field Trials

Pleuraphis rigida Germination



Conclusions

- Rinsing of seeds for 48 hours followed by 2 hours of drying increased germination from 50 to 100% and decreased time to germination by 2-5 days
- Light reduces germination so seeds should be buried
- Excessive drying after rinsing reduces germination
- Refrigeration after treatment reduces germination

Conclusions

- White bursage germinates and emerges in 5-7 days and prefers March seeding with cooler temperatures (12-17° C)
- Creosotebush emerges in 7-8 days and prefers April seeding with warmer temperatures (>22 C°)
- Plastic mulch, stabilizer, and gravel enhances germination and straw inhibits germination
- Soil types can influence species germination